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A history of the origins and progress of the Journal of Oral Surgery

■ *J. Orton Goodsell, D.D.S., Saginaw, Mich.*

About thirty years ago a trend developed in dental journalism toward professional publication of dental periodicals as opposed to proprietary control. At this time the American Society of Oral Surgeons (then the American Society of Oral Surgeons and Exodontists) began to consider publication of an oral surgery journal. A survey indicated that such a publication was feasible. The American Dental Association was asked to sponsor such a journal. The Journal of Oral Surgery began publication as a quarterly in January 1943 and has been successful from the start. In January 1958 the publication achieved bimonthly status and ten years later assumed the new title of Journal of Oral Surgery, Anesthesia and Hospital Dental Service.

The cultural level of any institution at a given moment in history can be determined by examination of the literature which that institution produced. In some ancient civilizations the written word is not decipherable or is not present. Then, archeologists may discover undestroyed artifacts or art that can inform, to a degree. But the written word has no superior as an agent in the transmission of knowledge from one to another whether it be used for the purpose of enlightenment on ancient or on current subjects.

An institution, regardless of what it may be, cannot exist in a vacuum. It is influenced by the general and special culture that surrounds it. Also, the people and groups involved and participating in the development of any particular part of that institution are important factors. It seems desirable at this time, "while many of those who participated in the origin of the Journal of Oral Surgery are still around, that a history of the Journal should be written."[1]

The record should be written in such a fashion that not only narrow, factual data will be be presented, but a picture, if possible, should be created of the scene and circumstances of origin. The need for relative brevity prevents a very elabo-

rate treatment of this approach. However, reference to professional journalism in general, the status of dental journalism, the position of oral surgery as a dental specialty and also the condition of its journalism, as well as the need for a journal of oral surgery, must be made. It is not necessary to dwell on the current high standards of dental education but, of course, this must be recognized as the foundation upon which oral surgery rests and, therefore, its journalism as well. As suggested, the background and environment of the creation by the American Dental Association of the JOURNAL OF ORAL SURGERY and that Journal's subsequent history will be presented, as well as the more precise aspects of publication.

Oral surgery is surgery of the mouth, jaws and associated structures. By definition:

> The specialty of oral surgery is that part of dental practice which deals with the diagnosis, the surgical and adjunctive treatment of the diseases, injuries and defects of the human jaws and associated structures.
>
> The scope of the specialty of oral surgery shall include the diagnosis, the surgical and adjunctive treatment of the diseases, injuries and defects of the human jaws and associated structures within the limits of the professional qualifications and training of the individual practitioner and within the limits of agreements made at the local level by the health team concerned with the total health care of the patient.[2]

The foregoing indicates the zone which, historically, has been assigned to dentistry when oral surgery has been needed. The reasons for this assignment are several, the foremost being that the mouth, jaws and associated structures anatomically, physiologically, pathologically and therapeutically receive detailed attention in the education of a dentist. Another reason is, of course, that medicine has educationally treated oral surgery in a superficial manner if at all. Furthermore, dental education has provided the basis for graduate oral surgery training and hospital residency programs that produce oral surgeons. The composition of oral surgery and its essential relations to dentistry as a whole have been included in this history of the JOURNAL OF ORAL SURGERY to illustrate the clinical and scientific field which oral surgery journalism should cover. The responsibility of dentistry in this literary field can be appreciated.

■ *Early Dental Journalism in the United States*

An inspection of the evolution of dental journalism reveals the fact that early periodicals were almost entirely proprietary. Ownership was vested in trade houses, privately owned dental schools and publishing houses. Obvious business advantages accrue to owners of journals if they can control the contents of the pages. Non-professionally-owned dental journals are not, necessarily, evil, but it would be naïve indeed to think that self-interest always can be excluded when literary material is selected or advertising acceptance decisions are made. In fairness to dentistry it should be stated that medicine once had the same general situation.

In 1928 Henry L. Banzhaf,[3] in his presidential address to the American College of Dentists, suggested that the College make a survey of the then existing dental journalism and report on "measures which may be effective in terminating the non-professional publication of dental

literature." A committee was appointed and a rather exhaustive study was made during the years of 1928, 1929, 1930, and 1931.[3] The report contained much informative material relative to dental journalism of that period as well as that of earlier years. In 1877 *The Canada Journal of Dental Science* had chided United States dentistry for not owning "at least one [journal] independent of . . . business interest" and in 1878 they remarked that "This Journal is the only one on the continent not published by . . . a special business interest."[3]

The following years saw many professionally sponsored journals come and go, failing for lack of financial support. In 1913 the organized dental profession brought forth the *Official Bulletin of the National Dental Association* which since has become THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. For a few years thereafter, little attention was paid to the elevation of dental journalism. In 1916 William J. Gies of Columbia University called "trade journalism in a profession . . . a form of vulgar autocracy."[3]

During the late nineteen twenties there was a stirring among professional societies, and many of them passed resolutions tending to arouse in members a sense of journalistic responsibility. Typical among them was the American Society of Oral Surgeons and Exodontists (now the American Society of Oral Surgeons) which, in 1930, urged "independent journalism."[3] The American Society of Oral Surgeons and Exodontists published two Bulletins: one in 1928 and the other about a year later. For many years the C. V. Mosby Company published the *International Journal of Orthodontia, Oral Surgery and Radiography*. This was a fine corporate journal which, in 1929, boasted a circulation of 8,300 but, as the name indicates, it had divergent interests and was not devoted solely to oral surgery. Furthermore the trend was to professional ownership of journalism and away from corporate or proprietary control. The present *Oral Surgery, Oral Medicine and Oral Pathology*, which is edited by Kurt Thoma and published by the C. V. Mosby Company, is the oral surgery successor to their previous periodical.

■ *Origins of the Journal of Oral Surgery*

Howard C. Miller, who was one of the chief moving spirits in the early promotion and publication of the JOURNAL OF ORAL SURGERY, in 1932 recommended to the American Society of Oral Surgeons and Exodontists, as its publication chairman, that the Society "make investigations" relative to the publication of an oral surgery journal.[4] This recommendation was inspired by efforts of the C. V. Mosby Company to interest the American Society of Oral Surgeons and Exodontists in utilizing its journal as the Society's official publication. In 1935,[4] at Dr. Miller's suggestion, the American Society of Oral Surgeons and Exodontists appointed an oral surgery journal committee, but "the thought was not then to tie it in with the American Dental Association." There is no record of activity by this committee, but the July 1936 Proceedings of the American Society of Oral Surgeons and Exodontists state as follows:

> . . . Secretary referred to a communication received from Dr. J. Orton Goodsell, of Saginaw, Michigan, relative to the need for a jour-

nal of oral surgery. It was voted that a committee be appointed to consider the advisability of a journal of oral surgery to cooperate with other groups which may be interested.[5]

In April 1936 the Chalmers J. Lyons Academy of Oral Surgery requested that:

> . . . Dr. J. Orton Goodsell, as its representative, appear before the American Dental Association Trustees at their next meeting and ask the American Dental Association to consider the publication of a journal of oral surgery under A.D.A. ownership and sponsorship.[6]

The previously mentioned 1936 action by the American Society of Oral Surgeons and Exodontists[5] was the result of the efforts of the Chalmers J. Lyons Academy of Oral Surgery to solicit the interest of the American Society of Oral Surgeons and Exodontists in its quest for a professionally owned and sponsored journal of oral surgery.

In what has been related heretofore, the trends of the times, the evolution of dental journalistic thought and a unification of ideas can be seen. An idealistic expression had emanated from the American College of Dentists and it was followed by the maturing thoughts of oral surgeons who desired a journal of oral surgery which would be published by organized dentistry, the formal parent of oral surgery.

In July of 1936 J. Orton Goodsell presented the desires of the Chalmers J. Lyons Academy of Oral Surgery to the Board of Trustees of the American Dental Association at their San Francisco meeting.[6] Dr. Goodsell was authorized by the American Dental Association Board of Trustees to select a committee and to proceed with an investigation that could reveal the need for, desirability of and feasibility of publication of a journal of oral surgery under American Dental Association ownership and sponsorship.[7] The 1936 American Dental Association Trustees records do not reveal the details of this 1936 committee appointment but on February 12, 1937, the Trustees[8] requested appropriation of $86.50 to pay for the cost of a survey which the Oral Surgery Journal Committee had made. The committee consisted of John Kemper, Don H. Bellinger, Howard C. Miller, Malcolm Carr, George E. Morgan (American Dental Association Trustee), and J. Orton Goodsell, the chairman. The committee believed that dentists other than oral surgeons would enjoy the reception of a journal of oral surgery. It felt that a journal of oral surgery was needed, was desired and could be economically self-supporting and, therefore, feasible.

Questionnaires were sent to all Michigan and Wisconsin dentists asking them if they desired and would subscribe to a journal of oral surgery which would be published by the American Dental Association. The response was most favorable, and it indicated that the income which could be derived from nationwide subscriptions would easily cover the cost of publication. A part of the survey had included estimates of publication cost. The detailed report of this Survey Committee on Oral Surgery Journal was presented to the Board of Trustees of the American Dental Association[9] on July 11, 1937, in Atlantic City, New Jersey. It was referred to the American Dental Association Committee on Journal by the Trustees, who seemed to be favorably impressed and who were inclined to consider seriously the publication of an oral surgery journal.

The investigating Survey Committee on Oral Surgery Journal had served its purpose and its existence was terminated, but certain groups continued their interest, particularly the American Society of Oral Surgeons and Exodontists who retained their Committee on Oral Surgery Journal, with its perennial chairman, Howard C. Miller.

The years 1937-1938 brought no particular progress toward a new journal of oral surgery. The American Dental Association at that time was engaged in another publication activity involving the *Dental Cosmos*.[10] The 1939 report of the Oral Surgery Journal Committee of the American Society of Oral Surgeons and Exodontists indicates a continuing interest on the part of this specialty organization in promoting a journal of oral surgery under American Dental Association ownership.[11]

The year 1940 was accompanied by increased activity aimed toward the realization of a new journal of oral surgery. The American Society of Oral Surgeons and Exodontists' Committee on Oral Surgery Journal considered affiliation of their project with the C. V. Mosby Company, but this was rejected in favor of a plan to ascertain the practicability of publishing a journal of oral surgery in alliance with the New York Institute of Clinical Oral Pathology, such a journal to be known as possibly, "The Archives of Clinical Oral Surgery and Pathology."[12] It had been learned, earlier, that the Institute was favorably disposed toward a merger of the *Archives of Clinical Oral Pathology* with the proposed new oral surgery journal.[13] Discontinuation of their pathology publication would follow.

Because of the previous 1937 report of the American Dental Association's Oral Surgery Journal Committee which indicated that a journal of oral surgery could be self-supporting,[9] and evidence of a corroborative character, uncovered during consideration of publication of the proposed new "Archives of Clinical Oral Surgery and Pathology," the American Society of Oral Surgeons and Exodontists passed a resolution requesting the chairman of the Society's committee, Howard C. Miller, to propose to the American Dental Association that it sponsor, own and publish a journal of oral surgery in collaboration with the American Society of Oral Surgeons and Exodontists and the New York Institute of Clinical Oral Pathology, each organization to have equal representation on the editorial board at all times. A part of the proposed plan of the American Society of Oral Surgeons and Exodontists was to send presubscription questionnaires, of the same general type that was used in 1937[9] in Michigan and Wisconsin, to all the dentists in the United States. A definite promise to subscribe to the "Archives of Clinical Oral Surgery and Pathology" at $5.00 per year, however, would be included.

A few days after this resolution was passed, Dr. Miller appeared before the American Dental Association Board of Trustees and presented to them the proposal outlined, with the suggestion from the American Society of Oral Surgeons and Exodontists that the American Dental Association conduct, and finance the cost of, the national questionnaires. If the cooperation of the American Dental Association could not be obtained, it was the intention of the Society to conduct the

national survey at its own expense and proceed with consideration of the "Archives" plan, independently.[12] However, this became unnecessary, as the Board of Trustees of the American Dental Association acted as follows:

> The Board of Trustees recommends that a survey be made to determine the interest of the membership in the publication of a Journal of Oral Surgery and further recommends that the By-Laws be amended to provide for such a publication in the event the survey indicates the desirability of such a Journal.[14]

Both recommendations were adopted.[14] Thus the American Dental Association had thereby indicated its intention of entering the field of oral surgery journal publication, if it could be proved to be a prudent venture.

E. G. Meisel, chairman of the American Dental Association Journal Committee, was of the opinion that ". . . the groundwork of fundamental problems underlying the proposition of publishing a specialty journal . . . should be carefully prepared so that . . . misunderstanding" would be eliminated before the sending of presubscription pledge questionnaires to all members of the American Dental Association.[15] The wisdom of this approach was appreciated, and the major portion of 1941 was devoted to the slowly moving process of perfecting details essential to the preparation of a membership subscription survey. During that year the committee from the American Society of Oral Surgeons and Exodontists conferred frequently with Dr. Meisel, who had made the proposal that certain facets of oral surgery journal publication must receive preliminary perusal. This committee consisted of G. Victor Boyko, B. Lucien Brun, J. Orton Goodsell, Sterling V. Mead, and Howard C. Miller, again a leading light and chairman. The assumption was, at least on the part of this committee, that the results of the projected survey would show the feasibility of American Dental Association publication of a journal of oral surgery. Therefore they made a rather thorough examination of the whole subject and their report to the American Society of Oral Surgeons and Exodontists and the American Dental Association included the following information and some recommendations:[16]

1. A "Formative Committee" for the journal of oral surgery should be appointed.

2. This Committee should proceed substantially as though a journal of oral surgery were to be published. All of the essential details describing the new journal should be included in the presubscription pledge cards that were about to be mailed to the members of the American Dental Association.

3. The Editorial Board should be appointed by the American Dental Association, but recommendations for membership on that Board, submitted by "special societies" interested in oral surgery "could be granted" consideration. To correct certain misconceptions it was explained that rules governing the American Dental Association do not permit joint responsibility with others in projects such as journal publication. Therefore, the original plan to have a journal of oral surgery editorially controlled, jointly, by the American Society of Oral Surgeons and Exodontists, the New York Institute of Clinical Oral Pathology and the Ameri-

can Dental Association had to be discarded.

4. The editor should be selected by the Formative Committee and his program should be integrated with the American Dental Association Journal.

5. Business problems such as publication costs, frequency of issue, advertising, subscription rates and so forth were described in the report.

6. The Committee's investigation revealed that available material of a high quality seemed more than adequate to maintain a frequently appearing journal of oral surgery.

The Journal Committee of the American Dental Association approved of these recommendations and a special Formative Committee on the Journal of Oral Surgery was officially appointed by the American Dental Association.[16] The members selected were Don H. Bellinger, J. Orton Goodsell, Leroy M. S. Miner, Sanford M. Moose, Carl W. Waldron, James R. Cameron, Thomas Conner, A. L. Frew, Sr., Oather A. Kelly, and Howard C. Miller. The Formative Committee conferred with Carl W. Waldron and selected him as editor when and if the Journal of Oral Surgery became a reality.[17] They also suggested that the editorial staff be appointed by the American Dental Association from a list submitted by the Oral Surgery Journal Committee of the American Society of Oral Surgeons and Exodontists, but this, as previously suggested, was officially impossible. The Board of Trustees of the American Dental Association, in October 1941, voted that the Committee on Oral Surgery Journal be authorized to proceed with the sending of questionnaires to determine how many subscriptions were obtainable, and a budget of $900 was allowed for the purpose.[18] The price was to be $5.00 per year. Publication was to occur quarterly, bimonthly or monthly.[17]

On February 1, 1942, from the Central Office of the American Dental Association, subscription pledge cards and descriptive material relative to the proposed Journal of Oral Surgery were mailed to the members of the American Dental Association. By February 20, 1942, the signed return cards numbered 2,702. On February 23, 1942, the Board of Trustees of the American Dental Association voted to publish a Journal of Oral Surgery,[19] on the following basis: It was to be, at first, a quarterly. The editor-in-chief was to be the editor of the American Dental Association. The editor of the Journal of Oral Surgery and the Editorial Board were to be appointed by the Board of Trustees of the American Dental Association and the associate editors by the Editorial Board. The subscription rate was set at $5.00 annually. L. Pierce Anthony was editor-in-chief of the American Dental Association and Carl W. Waldron was appointed as editor of the new Journal of Oral Surgery. The first Editorial Board consisted of the editor and the following: James R. Cameron, of Philadelphia; J. Orton Goodsell, of Saginaw, Michigan; V. H. Kazanjian, of Boston; Howard C. Miller, of Chicago, and Douglas B. Parker and Theodor Blum, both of New York.

Dr. Waldron, the first editor of the JOURNAL OF ORAL SURGERY, received his M.B. (M.D.) degree from the University of Toronto in 1911 and his D.D.S. degree also from the University of Toronto, in

1913. At the time of his appointment he was professor of oral surgery at the School of Dentistry, University of Minnesota, a member of the American Society of Oral and Plastic Surgeons, a Fellow of the American College of Dentists and also of the American College of Surgeons. He held membership in the American Dental Association, the American Medical Association and various other professional organizations. His graduate training was received, in part, at Johns Hopkins Hospital in Baltimore, and in World War I he had received numerous citations for valuable service in the treatment of facial war injuries. It was obvious that a man of breadth and experience had been selected to launch the new journal.

The first meeting of the Editorial Board took place in Chicago in the fall of 1942 in preparation for the initial issue of the JOURNAL OF ORAL SURGERY which appeared as Volume 1, Number 1 in January 1943. A list of the contributors to that first copy includes the following names: Frank S. Tichy, Philip M. Northrop, Clarence O. Simpson, Don H. Bellinger, Fred A. Henny, Leroy W. Peterson, V. H. Kazanjian, Earle H. Thomas, J. Orton Goodsell, Kenneth W. Penhale, Carl W. Waldron, Douglas B. Parker and Mary C. Crowley, M.S., who collaborated with Dr. Northrop on his article.

■ *Progress of the Journal*

As might be expected in the inauguration of a new venture, a reasonable number of difficulties were encountered, but they were overcome in one way or another without catastrophe. The subsequent history is marked by hills and valleys, but the high spots outnumber the depressions. The basic policy of publishing oral surgery literature of a high type under American Dental Association auspices has been maintained.

An index of the content of the JOURNAL OF ORAL SURGERY since its inception includes material of wide scope. The editors have made an effort to publish what is valuable in the technical aspects of oral surgery without letting the publication contain only manual procedures. A fine balance between the biologic and mechanical sides of oral surgery usually has been maintained. For example, among the contributions can be found articles on congenital and acquired deformities, fractures of the jaws and facial bones, tumors of all kinds, removal of impacted and other teeth, as well as articles on physiology, biochemistry, pathology and anesthesia. In fact, it is doubtful if any phase of oral surgery practice or education has been neglected. Original contributions and investigations, case reports, abstracts, editorials and so forth usually can be found in each issue.

The JOURNAL OF ORAL SURGERY remained as a quarterly until January 1958 when it achieved bimonthly status. Fluctuations in numbers of subscribers have occurred at various times—from a low of about 2,800 to a high of about 5,500. The regular subscription rate that originally was $5 per year became $8 domestic and $9 foreign in 1953, because of increases in publishing cost. An increase to $10 domestic and $12 foreign went into effect in 1958 as two more issues per year were added. Student subscriptions, in 1955, were made available at $4 annually. Single copies, which were $1.50 each in

1943, now are priced at $2.00. In addition to individual subscribers the publication is received by hospitals, schools, libraries and others. The American Society of Oral Surgeons requires its members to subscribe, and their dues include a levy to defray the cost. The publication has not shown a visible financial loss to the American Dental Association except during the subsidized, formative years from 1941 to 1943 and in 1947-1948 when the deficit amounted to $1,200. Other than that, a profit has been made (ranging from about $2,000 in 1950 to nearly $15,000 in 1958).[20] If all Central Office editorial and production expenses were allocated exactly, it is likely that the publication would have revealed a slight deficit on a few more occasions.[21] Advertising, at first refused, now is accepted. The advertising standards "cover all products and services offered for advertising . . . in American Dental Association media."[20] No advertising is accepted that does not conform to a rigid series of tests, for example, among them, the scrutiny of the Council on Dental Therapeutics. Details of the screening process can be found in the *American Dental Association Advertising and Exhibit Standards*.

Subscriber interest has been proportional to the reader appeal of the contents and also to the amount of promotional attention given by the Business Office. When the contributions have been uniformly noteworthy and the dentists have been made aware of that fact by the Business Office, and the possible advertising revenue has been realized, the JOURNAL OF ORAL SURGERY has posed no economic problem. Fortunately, there seldom has been any lack of attention to these details.

As stated previously, L. Pierce Anthony was the first editor-in-chief of the American Dental Association to counsel, aid and supervise the incumbent editor of the JOURNAL OF ORAL SURGERY. He was succeeded by Harold Hillenbrand, who served from 1945 until 1947, when Lon W. Morrey assumed the editor-in-chief duties. It can be seen that the editor of the JOURNAL OF ORAL SURGERY never was wanting in able and friendly assistance.

Carl W. Waldron served as editor of the JOURNAL OF ORAL SURGERY from 1943 until he resigned in 1948. Reed O. Dingman was the successor to Dr. Waldron beginning with the January 1949 issue. Dr. Dingman at that time was associate professor of oral surgery at the University of Michigan Dental School of Dentistry. He had received his D.D.S. degree at the University of Michigan in 1931 and his M.D. degree in 1936. During three of these intervening years Dr. Dingman had served under the late Chalmers J. Lyons as a resident in oral surgery at the University of Michigan Hospital. He also, later, had received graduate experience at Barnes Hospital, St. Louis, Missouri, and had spent some time at Geisinger Memorial Hospital and with Sterling V. Mead in Washington, D. C.[22]

Dr. Dingman served as editor of the JOURNAL OF ORAL SURGERY until July 1952, when Fred A. Henny assumed editorial directorship. Dr. Henny, one of the country's most distinguished oral surgeons, graduated from the University of Michigan School of Dentistry in 1935. He served his residency in oral surgery at Henry Ford Hospital from 1935 to 1938 under Don H. Bellinger. He was associate

in oral surgery, Henry Ford Hospital, from 1938 to 1952, when he became chief of the division of dentistry and oral surgery at that institution. At the present time Dr. Henny is editor of the JOURNAL OF ORAL SURGERY, ANESTHESIA AND HOSPITAL DENTAL SERVICE. He has memberships in the American Dental Association, the American Society of Oral Surgeons (president-elect), the Great Lakes Society of Oral Surgeons, the Chalmers J. Lyons Academy of Oral Surgery, Omicron Kappa Epsilon, and he is a Fellow of the American College of Dentists. He also continues as chief of the division of dentistry and oral surgery at Henry Ford Hospital, Detroit.

The following men have served as members of the Editorial Board of the JOURNAL OF ORAL SURGERY, at various times, from 1943 through 1958: Theodor Blum, James R. Cameron, J. Orton Goodsell, V. H. Kazanjian, Howard C. Miller, Douglas B. Parker, Carl W. Waldron, Joseph L. Bernier, Reed O. Dingman, Don H. Bellinger, H. Newman Brownson, William E. Durbeck, G. Thaddeus Gregory, L. M. FitzGerald, Herbert J. Bloom, Sanford M. Moose, Leroy W. Peterson, Fred A. Henny, Robert B. Shira, Malcolm W. Carr, P. Earle Williams, and James R. Hayward.

At the September 1958 meeting of the Board of Trustees of the American Dental Association the Board elected to change the name of the JOURNAL OF ORAL SURGERY to the JOURNAL OF ORAL SURGERY, ANESTHESIA AND HOSPITAL DENTAL SERVICE.[23] This new title began with the January 1959 issue. The editor-in-chief remains the same as previously—Lon W. Morrey; Fred A. Henny is the editor. Lyall O. Bishop, Richard J. Burch, Malcolm W. Carr, James R. Hayward, Leroy W. Peterson, Robert B. Shira, Fred A. Henny and Lon W. Morrey compose the Editorial Board. The associate editors have the following responsibilities: S. Elmer Bear manages the Queries and Comments and Clinical Observations section. William F. Via, Jr., supervises the Hospital Dental Service portion. Herbert J. Bloom reviews the Current Literature, Bruce L. Douglas is chief of the Anesthesia section and Robert B. Shira, the section on Oral Surgery.

It is obvious that oral surgery, hospital dental service and anesthesia are intimately related, but only time will tell whether the incorporation of these names into the title was wise. The main reasons for altering the traditional name were to promote wider reader appeal and to furnish an official outlet for hospital dental service literary efforts. The growing importance of hospital dental service and the increasing awareness of need for that service on the part of hospital staffs and administrations receive public recognition in the new title.[24] Anesthesia always has been of primary interest among all dentists. Dentistry has pioneered and used anesthesia of all types ever since the first anesthetic was employed. The inclusion of "Anesthesia" in the title is written recognition of an obvious historical fact. A great number of articles on anesthesia have been published in the JOURNAL OF ORAL SURGERY in the past and it would seem, sometimes, that more space has been devoted to that subject than to any other.

THE JOURNAL OF ORAL SURGERY, NOW THE JOURNAL OF ORAL SURGERY,

ANESTHESIA AND HOSPITAL DENTAL SERVICE, has become a recognized, valuable contribution to dental literature. It is well-edited, and contains material that should be of interest to all dentists, hospitals, libraries and students of the healing arts. Its ownership by the American Dental Association guarantees freedom of thought to its contributors in all respects, and it provides visual evidence of the dental parentage of oral surgery. Under the continued care and sponsorship of the organized profession, it is likely that the publication will continue to prosper and serve dentistry well.—*501 Second National Bank Building.*

1. Correspondence between Fred A. Henny and Lon W. Morrey, Feb. 29, 1956.

2. A.D.A. Transactions 1953, p. 218, 219.

3. American College of Dentists, Commission on Journalism. Status of dental journalism in the United States. Report of the Commission on Journalism 1928-1931. New York, American College of Dentists, 1932.

4. Correspondence between Howard C. Miller and J. Orton Goodsell, Jan. 1943.

5. Proceedings of the American Society of Oral Surgeons and Exodontists' Council 1936.

6. Correspondence from G. R. Maitland, secretary of the Chalmers J. Lyons Academy of Oral Surgery, 1936.

7. A.D.A. Transactions 1936, p. 124.

8. A.D.A. Transactions 1937, p. 60.

9. A.D.A. Transactions 1937, p. 100-105.

10. Report of the Committee on Oral Surgery Journal of the American Society of Oral Surgeons and Exodontists 1938.

11. Report of the Committee on Oral Surgery Journal of the American Society of Oral Surgeons and Exodontists 1939.

12. Reports of the Committee on Oral Surgery Journal of the American Society of Oral Surgeons and Exodontists to members and trustees, 1940.

13. Correspondence between J. Orton Goodsell and Howard C. Miller, 1940.

14. A.D.A. Transactions 1940, p. 320, 321, 332.

15. Correspondence between E. G. Meisel and Howard C. Miller, Jan. 19, 1941.

16. Report of the Committee on Oral Surgery Journal of the American Society of Oral Surgeons and Exodontists 1941.

17. A.D.A. Transactions 1941, p. 128, 129.

18. Correspondence between L. T. Claridge, American Dental Association business manager, and Howard C. Miller, Nov. 27, 1941.

19. A.D.A. Transactions 1942, p. 33-35.

20. Correspondence between Lon W. Morrey and J. Orton Goodsell, March 9, 1959.

21. Morrey, Lon W. In Report of the Committee on Oral Surgery Journal of the American Society of Oral Surgeons 1949.

22. Report of the Committee on Oral Surgery Journal of the American Society of Oral Surgeons, 1948.

23. A.D.A. Transactions 1958, p. 336, 337.

24. Correspondence between Lon W. Morrey and Fred A. Henny, 1958.

The development of the specialty of oral surgery in the past century

■ *James R. Cameron, D.D.S., Sc.D., Philadelphia*

As the dental profession pauses to celebrate 100 years of formal organization, it may take pride in all of its accomplishments, including its first highly developed specialty, oral surgery. The list of notable men and their contributions is indeed impressive; however, if the ground already won is to be retained and improved for both the public and dentistry's welfare, much additional work remains. Many of the problems are more amenable to solution only if graduate training in oral surgery continues to improve and expand at the academic and hospital clinic level. Thus, with means available to render a superior health service, oral surgery should increase in scope and remain governed by the standards and statutes of dentistry rather than by those of medicine.

The editor has bestowed upon me the signal honor to write briefly regarding the development and progress of oral surgery as a dental specialty during the 100 years that the American Dental Association has been in existence. Any attempt to cover the growth and development of oral surgery in America during this period would require many hours of painstaking research and more pages of the written word than is available in this issue of the JOURNAL OF ORAL SURGERY, ANESTHESIA AND HOSPITAL DENTAL SERVICE. Further, to record such a history accurately would require a more inquisitive and methodical mind than this writer possesses. However, those of us engaged in dental teaching and in the practice of oral surgery cannot help but be mindful of the achievements of men who long ago recognized the important role that oral surgery should, and would, occupy in the future education of a dentist.

One hundred years ago, oral surgery, as we understand it today, did not exist. Dentistry, as a profession, was young and not too highly considered by the older professions. The demand, however, for oral care was increasing and taxed the resourcefulness of those who were practicing this part of the art of healing. Although opportunity for training was meager, dentists of that day rapidly developed great mechanical skill and this largely dominated the thinking of the then young profession. It was only natural that diseases of the structures associated with the teeth and jaws would come under the observation and the care of a dentist whose digital skill and primary interest in this part of the human body was more constant and more intense than that of medical practitioners. As the scope and demands of dental practice continued to expand, the need for a broader concept of the basic sciences as related to diseases and malformations of the jaws and associated structures became of paramount importance. Such thinking led to a closer

association and understanding with the practice of medicine, which was likewise expanding. The need for a wider educational program for the training of physicians occupied much of the thinking of medical educators of that day, so much so that little consideration was given to the growing need of dental education. As a result, dentistry, even though its basic reason for existence was similar to that of medicine in the prevention of disease—the alleviation of human suffering and prolonging of human life—developed into a separate profession from medicine and formulated its own course of study and practice regulations. Dentistry, as an autonomous profession, has made tremendous progress in its development as a health service and one cannot help but wonder if comparable progress would have taken place had medicine included formal dental education as part of the older and wider field of medicine 100 years ago. Insofar as this did not occur, dental education has made its own niche and can be justly proud of the manner in which it has grown and developed, within its own structure, important specialties, the oldest of which is oral surgery.

To the credit of a few early physicians, whose vision extended well beyond the then accepted scope of medical practice, must be given recognition as pioneers in realizing the importance of training in caring for oral disease. These early medical practitioners, possessing but a meager knowledge of dental procedures, did much to attract attention and stimulate interest in the need for formal education in the field of oral surgery. The names of Ambroise Paré, Fauchard, Horace Hayden, Chapin A. Harris, John Hunter, Simon P. Hullihen, John S. Marshall and many others, equally distinguished, will remain forever as leaders in the early recognition and development of oral surgery.

Formal education in dentistry in the United States began with the opening of the Baltimore College of Dental Surgery in 1840. This school is still in existence under the name of the School of Dentistry, University of Maryland. With the appointment of James E. Garretson in 1864 as professor of oral surgery in the Philadelphia Dental College, now the School of Dentistry, Temple University, the teaching of oral surgery became a major subject in the dental curriculum and has continued to be taught as such in all the dental schools. Matthew H. Cryer, who was closely associated with Garretson, devoted much time to the study of anatomy and gave to the profession his excellent text, *Internal Anatomy of the Face*.

With formal dental education in the United States well established in schools, separate from those of medicine, the specialty of oral surgery has developed through the efforts of practitioners who have received a dental education. The high standard of oral surgery, as practiced today, is due to the vision and untiring efforts of dentists rather than physicians—and the acceptance of this dental specialty by the public, and the recognition given by allied professions, reflect credit on dentistry as a whole. The advisability of an oral surgeon possessing a degree in medicine has been, and continues to be, frequently discussed. In the early days of medical and dental education, the acquisi-

tion of both a medical and dental degree was not considered either a financial or a time-consuming hardship. In fact, both degrees could be obtained in less time than is now required to qualify for one. The economic situation as it is today and also the length of time required to prepare for and to graduate in medicine, plus the equal required numbers of years necessary to obtain a dental degree, seem to outweigh the possible benefits that might be obtained, especially when the course in medicine does not attempt to cover dentistry. Much of the basic material taught in the medical course of study is largely a duplication of what the student receives in dental school. Oral surgery, as such, is not taught as a major subject in medical schools, whose curriculum occupies a full number of hours. Further, as the subject material taught in a medical school continues to increase, little time could be devoted to anything like the comparable training presently offered in undergraduate dental schools and to graduate dental students.

The need for advanced study in oral surgery, over and above that on the undergraduate level, has brought into existence graduate studies in this specialty. Various universities are now offering basic science courses correlated with clinical practice and cover such subjects as anatomy, physiology and pharmacology, histology, pathology, microbiology, physical diagnosis with ward rounds and patient workup, anesthesiology, allergies, neurology and nutrition, oncology, otorhinology, radiology and medicine. In the Graduate School of Medicine, University of Pennsylvania, the course covers one full academic year, and the students in oral surgery take the same basic science courses of instruction and the same examinations as the graduate students in the various medical groups. It has been most gratifying to the basic science teaching staff in this school to observe the high standard of comparable grades by the oral surgery students with those of the medical specialties—all of which lead to a closer association and understanding of medico-dental relationships in later clinical and teaching practice.

It would be impossible in an article such as this to enumerate all of the early practitioners who distinguished themselves in developing the specialty of oral surgery. Any attempt to do so would, I am sure, result in many oversights; likewise, a similar oversight of the many progressive men of today who are contributing so much to the progress of this specialty. However, as one reviews the growth of oral surgery, the names of certain contributors to that progress cannot fail to attract attention. LeMonnier, a French dentist in 1764, is generally credited as being the first to record the closure of a cleft palate. Correction of this deformity, either surgically or through use of a prosthesis, has always been considered within the field of oral surgery or dental prosthesis, and it would be remiss not to mention the names of a few outstanding oral surgeons who contributed greatly to developing this branch of practice. Chalmers Lyons of Ann Arbor, Michigan, did much to lay the foundation for present day thinking and to stimulate the practice of teamwork in caring for these unfortunate cripples. Since the day of Lyons and Truman W. Brophy of Chicago, tremendous progress has been made in this particular field,

which now not only embraces surgery but all branches of dentistry, speech training, psychological and psychiatric guidance as part of the over-all picture of rehabilitation. An outstanding example in this regard is the Lancaster Cleft Palate Clinic of Lancaster, Pennsylvania. Herbert K. Cooper, an orthodontist, through untiring efforts and enthusiasm, has fostered and developed an institution now receiving world-wide recognition.

As dentistry in the past 100 years has advanced, so has the specialty of oral surgery, and the increasing demand for this type of surgery on a high level has brought about a changing concept of educational standards. Both World War I and World War II stimulated interest in advanced training programs for oral surgeons. Since World War II, very definite progress has been made in graduate dental education on a much wider scope than was considered necessary in the past. Boards for certifying specialists in different fields of dentistry have come into existence. The American Board of Oral Surgery was established and functioning in the fall of 1946. The founder members were Howard C. Miller, Carl W. Waldron, James R. Cameron, Leslie M. FitzGerald, Athol L. Frew, Frank B. Hower and Aubrey L. Martin. The standards set up by the American Board of Oral Surgery for certification as a specialist have done much to foster interest and develop training programs on the graduate level. The American Board of Oral Surgery, by continuing the high standards necessary for certification in oral surgery, assures the future of this specialty in its proper scope and domain. Should, however, the vision of what oral surgery as a dental specialty really embraces be lost or the standards for certification be lowered through political influence, this special branch of dentistry could very readily lose its identity and, in its major aspects of practice, gradually be absorbed into the field of medicine.

Increasing interest is now being shown in the demand for advanced formal training in oral surgery, so much so that some graduate schools are hard pressed to provide adequate physical equipment to accommodate the number of applicants. All of this speaks well for the future growth of oral surgery on a high educational level. The increased interest in and demand for residency training in oral surgery throughout the country is comparatively recent and poses a problem in providing training centers. It is gratifying, however, to observe a steady increase in the number of general hospitals now offering opportunity for training in oral surgery under the guidance of capable oral surgeons. Hospital administrators and members of medical staffs are becoming increasingly aware of the many advantages that a well organized and competently staffed oral surgery service can offer in the over-all care of the sick and injured. Dentistry, in all its branches, including oral surgery, is in a transitional stage. During this period of expanding thought and practice, it is only natural that some misunderstanding as to the scope of practice can be expected. With dentists educated in a school separate, in a large part, from a school of medicine, some difference of opinion between dentists and physicians is bound to exist. Such differences can be ironed out best on the local level in friendly discussion between the parties concerned. It appears difficult, however,

for a small segment of the medical profession to realize that dentists can and are being educated on a comparable level with students of medicine. The attitude of the Joint Commission on Accreditation of Hospitals, in its recent stipulated requirements for accreditation of hospitals, fails to recognize the present high standard of dental education. In fact, the thinking of the Commission seems to be related to dental education as it existed 50 or 75 years ago. This attitude of medical men, who comprise the membership of the Commission, is most regrettable and one not shared by physicians at large. Dental representation on the Joint Commission on Accreditation of Hospitals would do much to enlighten the members of the Commission as to what constitutes the practice of dentistry and the specialty and scope of oral surgery that could best serve the practice of a general hospital. The embarrassing situations that some oral surgeons are experiencing in certain parts of the country as a result of the shortsighted and, at times, antagonistic, attitude influenced by the Joint Commission on Accreditation of Hospitals is not a new problem by any means. It has been with us for some time. With the advancement of dental education and the excellent training of oral surgeons now available, however, the status of oral surgery has taken on a definite size and form which can no longer be pushed aside as of little importance. The answer will never be solved by angry controversy, but rather by the public recognizing who best serves their particular interest. Patients requiring major oral surgery belong in a general hospital, and unless the authorities responsible for the conduct of general hospitals recognize the rightful place for a dental specialty on the same level as other surgical specialties, we can expect to see an increase in the number of well equipped, special dental hospitals arising throughout the country.

As the American Dental Association celebrates its 100 years of existence, one can visualize various highlights in the history of dentistry and its specialties. The continuous progress that has been made in the past 50 years in both general and local anesthesia has opened the door to more extensive and more accurate types of surgery than was possible formerly. Congenital and acquired deformities of the jaws, prior to the present methods of anesthesia practice, were often tolerated and looked upon as having little hope for correction. With the newer technics of anesthesia practice and the increased safety of anesthetic agents, an entirely new field for the oral surgeon has become available. Present day practice in anesthesia is a far cry from the days of straight nitrous-oxide anesthesia and hurried traumatic surgery. Local and regional anesthesia have become commonplace because of the simplicity and safety of the anesthetic solutions available—again, so different from the days of "shot gun" stock cocaine solutions upon which the early practitioners relied.

The use of the x-ray has become so commonplace in everyday practice that we wonder how early practitioners managed without this extremely valuable diagnostic and therapeutic aid. Yet, it is interesting to read descriptions of fractures, cysts, tumors and osteomyelitis in the oral surgery texts published before the use of the x-ray. Clinicians of that day were keen

observers of what they encountered and accurately recorded their observations by printed word and sketch.

The advent of antibiotic agents has relegated to the past many of the once troublesome and often fatal diseases that caused great concern to early oral surgeons. These agents have revolutionized much of oral surgical practice in reducing the incidence of toxic infections. With judicious use, antibiotic agents have made possible many surgical procedures that formerly were often, from the standpoint of infection, considered too hazardous to undertake.

Dentists, as a result of advanced education in the health field, are extremely "cancer conscious"; and with this attitude, a renewed interest in the study of both general and oral pathology is evident throughout the profession. Much of the stimulation in this field has come about with the forming of various study groups throughout the country, notably the New York Institute of Clinical Oral Pathology and the Armed Forces Institute of Oral Pathology in Washington, D. C.

The student of oral surgery today is increasingly conscious of the need for a thorough background in basic science subjects if his technical skill is to be developed on a solid understanding of the type of surgery required to meet the exactness of a diagnosis. With an understanding of the widening scope of practice, the responsibilities of the modern oral surgeon are increasing rapidly and can only be fulfilled by those whose formal training, over and above that received on the undergraduate level, has prepared him to accept the challenge of a greater responsibility.

When one looks over the amount of literature in the form of past and current periodicals—number of excellent textbooks, all dealing with the practice of oral surgery—the various organizations such as the American Society of Oral Surgeons, which was primarily a society of exodontists when established in 1918—and a cross-country view of regional oral surgery societies, one is impressed with the tremendous progress that has taken place in the development and expanding scope of this dental specialty during the past 100 years. The interested reader might, with profit, refer to the excellent articles by Truman W. Brophy,[1] Kurt H. Thoma,[2,3] Manuel M. Maslansky.[4]

As this period of organized dentistry in the United States passes into history, we can look with pride on what dental education has accomplished during that period. We can, likewise, look to the future with confidence that dental education will continue to make progress and that dentistry's oldest specialty, oral surgery, will also expand and remain governed by the standards of dental education and statute rather than by those of medicine.—*269 South Nineteenth Street.*

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The American Society of Oral Surgeons: factors contributing to its birth, growth and present status in the health field

■ *Leslie M. FitzGerald,* D.D.S., Sc.D., Dubuque, Iowa*

The aims and functions of the American Society of Oral Surgeons can be understood completely only in the light of the historical growth and development of oral surgery as a dental specialty. Although the past has been marked with a superior and enviable record of achievement, the Society must continue to assist in the improvement of health services within the framework of organized dentistry if it is to fulfill its purpose. These improved services will be gained primarily by a program of graduate study and the establishment of a standard of requirements for the practice of oral surgery as a specialty of dentistry.

Dentistry, in celebrating its one hundredth anniversary as an organized profession, looks back over a century of progress which constitutes an enviable record. This is a significant occasion, and commemorates the establishment of a great health profession which, through discovery, scientific research and clinical observation, has made many advances.

The scope of dentistry has broadened from one that is limited and localized into one in which relationships between oral disease and general health and oral manifestations of systemic disease, have been definitely established. The profession now utilizes scientific knowledge in the evaluation and proper treatment of diseases of the mouth, and in the replacement by artificial substitutes of structures lost through disease or other causes.

For many years efforts have been made to bring about a closer relationship between medicine and dentistry. In recent years this gap, which had been generally ignored by both professions, has been narrowed through research, clinical observation, recognition of the importance of dental service in the modern hospital, and the efforts of dental and medical organizations to correlate the interests and problems of the two professions. This has resulted in a fuller appreciation of the value of dental service and of dentistry as an important division of modern health service.

In the past, physicians as a rule have minimized mouth conditions. Many persons visit their dentist more often than they do their physician, and the dentist is thus in a strategic position to fulfill his obligations to his patients and to the medical profession, because of his opportunity to observe manifestations of systemic disease in patients before medical aid has been sought. Through routine history taking and careful observation, oral symptoms indicative of the onset of systemic disease may be noted, and the dentist who routinely follows such procedure and who cooperates with the physician is usually rewarded for his efforts. Most patients, realizing that such an examination is more complete, regard these attentions as indications that the dentist is interested in their welfare, and appreciate that there are connections between oral conditions and general health.

The physician frequently needs the advice and services of the dentist in the treatment of general disorders, as, on occasion, he is defeated in his efforts to relieve patients because of some neglected oral disturbance. Consultations between physicians and dentists are more frequent nowadays than in the past, and there is a decided trend toward closer cooperation between the two professions, even though it has not yet attained the degree that is desirable for the best interests of the patient, physician and dentist.

Dentists and dental organizations are now recognized as being essential to all public health programs. In these programs they cooperate with physicians, nurses and other public health workers. For this reason the dentist must have an adequate knowledge of hygiene and preventive medicine, as he is often called on for advice on health problems, particularly as they relate to dental care. It is imperative, therefore, that there should be even closer cooperation between physician and dentist. Dental education should include adequate instruction in the relation of oral pathology to systemic disease. Hospital routine and organization, as well as a general training in the principles and practice of medicine, should be included in the dental curriculum. Dentists should be encouraged to seek hospital affiliations, and dental research should be stressed so that a scientific basis for all aspects of dental service may be firmly established.

Oral surgery, the first specialty to be developed in dentistry, has continued as an important branch of dental practice. Certain fundamental principles, developed in the early period, not all of which are currently applied as originally presented, have, through modification and improvement, become important influences in oral surgery as it is practiced today. These, together with recent developments in research and application, have determined the basic principles in the present day practice of this dental specialty.

Surgical operations on the jaws and related structures have been performed for as long as there has been knowledge of the practice of medicine, although in the earlier periods they were not classified as oral surgery but were included as part of general surgery. Dental history honors the names of several men who, during their distinguished careers in the early practice of medicine, became interested in the diagnosis and treatment of diseases of the mouth, and who laid the founda-

tion upon which has been erected the specialty now known as oral surgery.

In the early days, those who practiced either medicine or dentistry were often inadequately trained according to present day standards. Yet, by virtue of necessity, they were called upon to perform operations within the oral cavity and on related structures, and through natural aptitude or sheer good luck or a combination of the two, were able to achieve good results.

Denton,[1] in his lectures on the history of dentistry, referring to Jourdain and the establishment of oral surgery, states:

> Although, of course, various operations in connection with the mouth and its neighboring parts had been performed by general surgeons and dentists for centuries, yet it was not until the latter part of the 18th century that anybody conceived of oral surgery as a distinct specialty. In 1778, Jourdain published his work on *The Surgical Diseases of the Mouth*. The study of oral diseases, both in his own practice and in the writings of ancient and contemporary surgeons, was his life work. It was Jourdain's conviction that the field of surgery had become so extensive that no one person, however learned, should attempt to deal with the whole field; and for this reason, he felt that oral surgery as a specialty was justified. On the other hand, he considered that the work in this field done by dentists, even the most distinguished (such as Fauchard) was not adequate and not undertaken with a sufficiently broad surgical view. Jourdain's work, which appeared in two volumes, was organized in the rather unusual way of dealing in one volume with the diseases of the upper jaw, and in the other with those of the lower jaw. In spite of this peculiarity, it covered rather systematically a large part of what today constitutes the field of oral surgery and furnished innumerable cases of the various diseases discussed. Eighteen chapters are devoted to conditions of the maxillary sinus. Among the subjects treated are the various tumors, cleft palates, caries and necrosis of the bone, abscesses, diseases of the salivary ducts, diseases of the gums, ranula, calculi, and hemorrhages.

According to dental history, the first American to have an intensive practice in oral surgery, at the same time that he conducted a large practice in dentistry, was Simon P. Hullihen, who practiced in Wheeling, West Virginia, from 1835 until his death in 1857. Hullihen, at the age of 22, was granted an honorary degree of Doctor of Medicine by the Washington Medical College, Baltimore, in 1832. In 1843, in recognition of his growing reputation in the special practice of dental and oral surgery, the Baltimore Dental College conferred upon him the honorary degree of Doctor of Dental Surgery.

His writings were noted for clarity of expression and quality of thought. He said: "The dentist must carry upward the standard of his profession and plant it upon the broad platform of medical science, he must claim for himself and his profession the same respect and importance awarded to other branches of the healing art, and that, too, upon the same ground—the ground of a thorough scientific education." These opinions are generally held by members of the dental profession today.

Doctor Hullihen, a man who was crippled in his youth, and with very meager opportunities for education, won distinction not only as a dentist of rare skill but in both general and oral surgery, became the foremost man of his time. Through his work and his writing, he had a great influence on many men who later developed further the specialty of

oral surgery in many of the great health centers, and by their achievements forced universal recognition of this great field of work until oral surgery has become a necessary part of every health center and of every dental school curriculum.

James Edmund Garretson, who is generally recognized as the father of oral surgery, was born in Wilmington, Delaware, in 1828, and died in 1895. He was profoundly influenced by the work of Hullihen, and he also saw that there was a great need for and future in this specialty. It was he who named the specialty "oral surgery," and in 1862, after obtaining both a medical and dental education, he became a member of the faculty of Philadelphia Dental College, now Temple University School of Dentistry. In 1864 he introduced oral surgery as a major subject in the school's curriculum and included an oral surgery hospital in his physical plant. He held the position of professor of anatomy and surgery.

In 1869 he published his textbook, *System of Oral Surgery*, which contained information regarding cysts, benign and malignant tumors, operations for cleft lip and palate and resection of the maxillary bones. In 1880 he was appointed dean of the school, a position he held until his death 15 years later.

The unique position which he held in the dental and medical professions was based on the fact that as an educated, highly skilled and practical dentist, he brought into the field of oral surgery a wealth of digital training which stood him well in hand in the operations within the oral cavity.

He saw an opportunity for vast improvement of the methods in vogue for operations on the face and jaws, and was able to apply his training in dental methods directly to these problems. One of his objectives in operating was to avoid external mutilation of the features.

His dental training made him appreciate the possibility of the dental engine in bone surgery, and he proved its worth by constantly using it in his work. Doctor Garretson was the first and foremost oral surgeon to point out the importance of intraoral oral operations and to utilize the method, thus preventing facial mutilations.

Among the many contributions Garretson made to the science and practice of oral surgery, the following stand out as having the greatest influence on its development:

1. Organizing of oral surgery as a specialty in teaching institutions.

2. His textbook, *System of Oral Surgery*.

3. His emphasis on the cosmetic effect in operations.

4. The use of the intraoral incision.

5. The use of the dental engine in bone surgery.

Garretson's textbook on oral surgery, the first dealing with this subject, remains as a permanent record of his surgical and literary achievements, and for many years was the only work of its kind.

Fortunately there were other distinguished pioneers collaborating with and following Garretson in establishing oral surgery on a sound basis, making valuable contributions and laying the foundation for a specialty that today commands the highest respect of both the medical and

dental professions. Among these pioneers was Matthew A. Cryer, with his studies on the variability of facial structures, especially of the maxillary sinuses, in 1895, and his contributions to surgical technic, particularly in the operation for resection of the mandible. There was Truman W. Brophy, who for many years was one of the leading exponents of oral surgery as a specialty of dentistry, and whose contributions to the operation for cleft palate are still recognized as a distinct advance in oral surgical procedures. And there was Thomas L. Gilmer, who contributed so much on the stabilization of mandibular fractures by intermaxillary appliances, including the introduction in 1881 of intermaxillary wiring which is still an accepted method of treatment. Additionally, there were the contributions of Kazanjian, Thomas Fillebrown, John S. Marshall, George V. I. Brown, Chalmers J. Lyons, Howard C. Miller and many others which have had a definite influence on the modern practice of oral surgery.

The spectacular advancements made in the field of anesthesia during less than a century have had a tremendous influence on the development of modern surgery. With the discovery of general anesthesia and the improvement in local anesthetic solutions and in the technic of administration, operations that previously were considered impossible were performed almost routinely. The discovery of nitrous oxide by Wells, a dentist, in 1844; the use of sulfuric ether by Long in 1842, and its first public demonstration by Morton, a dentist, in 1846; the extensive use of chloroform as an anesthetic agent by Simpson; and the combination of oxygen with nitrous oxide (nitrous-oxide-oxygen) advocated by Andrews in 1868, were particularly significant in the practice of oral surgery.

More recent advances in general anesthetic agents and in the method of their administration that have influenced the development of oral surgery and greatly improved conditions under which operations may be performed are nitrous oxide and oxygen administered by the endotracheal method which is supplemented in certain cases by vinyl ether, thiopental sodium and other anesthetic agents in use today.

Nitrous oxide and oxygen is still the general anesthetic used most extensively in oral operations, and is still the one best suited for operations performed in the dental office, with a much wider choice possible for the hospitalized patient.

The effort to render surgical operations painless through the medium of a local anesthetic is almost as old as the practice of medicine itself. Centuries ago physicians attempted to dull the sensorium during operation through the use of various drugs which produced a comatose state, and sought an agent which would act locally and produce anesthesia over a circumscribed area. The local anesthetic effect of many drugs has long been recognized, and the literature describes the early use of cold applications and local pressure to lessen pain.

The invention of the hypodermic syringe by Alexander Wood in 1853, which was a perfecting of the first syringe invented by F. Ryndo in 1845, made possible a new method of applying anesthetic drugs. Various drugs were employed, none of which proved of much value until Koller introduced cocaine in 1884. How-

ever, cocaine was not used extensively until epinephrine was added to the solution, following the isolation of the active principle of the suprarenal gland in 1901. The vasoconstricting properties of epinephrine delayed the absorption of the cocaine, thereby prolonging anesthesia and reducing its toxic effect. In 1905, Einhorn succeeded in synthesizing procaine which has the anesthetic properties of cocaine with about one seventh of its toxicity. It embodies the five classical requirements of a local anesthetic solution laid down by Braun, and is at present generally accepted as one of the most effective and safest local anesthetic agents now available.

The practical usefulness of any local anesthetic depends primarily on the abolition or blocking of sensory impulses from the field of operation. With the local anesthetic agents in use today, the addition of a safe, efficient vasoconstrictor is necessary to prolong anesthesia and to lessen toxic reactions caused by too rapid absorption of the injected solution. At present the vasoconstricting agents in general use for oral operations are epinephrine, nordefrin hydrochloride and phenylephrine hydrochloride.

Conduction anesthesia, first introduced in America by Guido Fischer of Marburg, in 1910, was not entirely new, as in 1885 Halsted, of Johns Hopkins University, blocked the inferior dental nerve with cocaine and demonstrated conclusively that the nerve trunk could be blocked by injecting it at any point along its course. The introduction of procaine-epinephrine solutions and the technic of administration demonstrated by Fischer gave a new impetus to oral surgery. The success of this procedure, which required a knowledge of anatomy, stimulated the dental profession further in the study of anatomy and physiology.

Progress in roentgenology and the use of oral roentgenograms in the preoperative determination of diseased or abnormal conditions, their use in the observation of immediate postoperative results and for periodic observation after extensive operation have been the basis for much of the improvement in diagnosis and surgical procedures. The more recent refinements in equipment and technic of production, and the greater skill in interpretation of roentgenograms, have led to still further advances.

The early practical applications of roentgenography in dentistry were principally for the removal of impacted teeth. Oral surgeons were first to recognize the importance of routine roentgenograms for diagnostic and operative use. Of all dental practice, only in oral surgery is roentgenography utilized to approximately its possibilities of service.

A correct diagnosis, based on complete examination and sound surgical judgment which has been developed through scientific knowledge and experience in the treatment of abnormal and pathologic conditions of the mouth, is the basis of all successful treatment and should be made before any operative procedure is undertaken.

The work of Billings, Rosenow and others who developed the theories of focal infection has had a profound influence, not only on the development of oral surgery, but on dentistry as a whole. Since 1910, when the theory that oral infection was responsible for many systemic dis-

turbances was advanced, it has been definitely established that diseases of the teeth and the supporting tissues have an important relation to general health.

Probably no greater challenge than this has ever been given to a profession. Since the medical profession showed no particular interest in oral conditions or a desire to treat diseases of the teeth and jaws, dentistry was faced with the responsibility of aiding in the solution of this vital problem. What was demanded was a knowledge of biology, physiology, bacteriology, pathology, anatomy and oral diagnosis, as well as perfection in surgical procedures for the eradication of oral infection. As a consequence, educational requirements in dental schools were radically revised to include a proper foundation of knowledge to meet this new obligation. Advances were made in diagnosis and surgical treatment. New equipment and instruments were developed. Special training became a necessity. Prior to 1910 the extraction of teeth was considered a part of the general practice of dentistry, with very few men specializing in this type of work. With the increased interest in focal infection, many dentists directed their special attention to that part of dental practice which deals with the diagnosis, the surgical and adjunctive treatment of diseases, injuries and defects of the human jaws and associated structures.

■ *American Society of Oral Surgeons*

Formation of a society of dentists concerned with oral surgery began to take shape at the 1916 annual meeting of the National Dental Association (now the American Dental Association), when there was a meeting of a small group of men who were limiting their practice to exodontics and other phases of oral surgery. The group realized the need for an organization "to promote and advance the science of Oral Surgery and Exodontia; to encourage research; to promote unity and harmony among its members and to elevate the standards of practice; to cooperate with other dental societies; and to enlighten the Dental and Medical Professions and the general public in matters relating to Oral Surgery and Exodontia." After some discussion, the group decided a survey should be conducted to determine how many men were interested in the establishment of such an organization.

Two years later, at the annual session of the National Dental Association in Chicago in 1918, an organizational meeting took place at the Auditorium Hotel. At this meeting Menifee R. Howard of Denver, Colorado, was elected chairman, and C. F. B. Stowell of Chicago, secretary.

The chairman appointed a committee to draft a constitution and bylaws. This committee included Joseph P. Henahan of Cleveland, George B. Winter of St. Louis and Arthur E. Smith of Chicago.

There were 29 signers of the original charter and the official name, "The American Society of Exodontists," was adopted.

The officers elected were: A. Brom Allen of Chicago, president; Menifee R. Howard, president-elect; Joseph P. Henahan, vice-president; C. F. B. Stowell, secretary; Frank W. Rounds of Louisville, Kentucky, treasurer; Joseph P. Wahl of New Orleans, Louisiana, H. W. Allen of Kansas City, Missouri, and Harry Bear

of Richmond, Virginia, the Board of Censors.

The second meeting of the Society was held at the time of the annual meeting of the National Dental Association in New Orleans in 1919 and was devoted entirely to organizational matters.

The officers elected at this meeting were president, Menifee R. Howard of Denver; president-elect, F. L. Warren of Los Angeles; vice-president, John W. Seybold of Denver; secretary, Frederick F. Molt of Chicago; treasurer, James A. Blue of Birmingham; Council, George B. Winter of St. Louis, C. F. B. Stowell of Chicago and B. H. Harms of Omaha.

The first scientific program was held in Boston in 1920. The sessions were held at the Harvard Dental School.

In 1921 the annual meeting was held in Milwaukee where a controversy over the name developed and the name was changed to "The American Society of Oral Surgeons and Exodontists." This name continued until 1946 at which time the present name, "The American Society of Oral Surgeons," was adopted.

Specialization in dentistry began in 1928 when the American Society of Oral Surgeons and Exodontists appointed a committee to "formulate standards of specialty practice." In 1932 the same Society appointed another committee assigned to "formulate plans for a national board" and in 1936 the two committees dealing with aspects of specialty practice were combined.

As a result of the deliberations of the combined committees, the Society created a National Board of Examiners in 1940. This Board was not officially chartered and no examinations were held.

In 1945 the American Society of Oral Surgeons authorized the formation of the American Board of Oral Surgery to conduct examinations for the certification of specialists in the field of oral surgery. The newly organized board was incorporated under the laws of the State of Illinois. The board also petitioned the House of Delegates of the American Dental Association to direct the Council on Dental Education to develop general standards and requirements through which recognized specialty boards could be established in the profession of dentistry. The House of Delegates approved the resolution and in 1946 The American Board of Oral Surgery was established as the first recognized specialty board in dentistry.

As for publication of a journal, action began in 1936 when an "Oral Surgery Journal Committee," with Howard C. Miller as chairman, was appointed to study the possibilities of a journal of oral surgery.

It was the judgment of the Society that such a journal should be published under the auspices of the American Dental Association.

After some years of promoting the idea of a separate journal devoted to oral surgery and allied fields, the Board of Trustees and the House of Delegates of the American Dental Association authorized the publication of the JOURNAL OF ORAL SURGERY of the American Dental Association and the first issue was published in January 1943.

Through the years, the American Society of Oral Surgeons has been a potent factor in the development of oral surgery as a well established specialty of dentistry.

It has made a significant contribution through its leadership in the publication of the JOURNAL OF ORAL SURGERY, ANESTHESIA AND HOSPITAL DENTAL SERVICE, in founding of the American Board of Oral Surgery, in the development of graduate programs and improvement of educational standards, in the encouragement of better relations between dentistry and the other health professions, and in its concern with hospital administration.

The American Society of Oral Surgeons has grown from 29 members in 1918 to 876 in early 1959. With this growth and the need for additional services to the members and a closer liaison between the health professions, the Society was reorganized in 1958 with the establishment of a central office in Chicago under the direction of a full time executive secretary.

■ *Oral Surgery as Branch of Dentistry*

The evolution of oral surgery has been as a branch of dentistry, and the majority of men now practicing this specialty are dental graduates. Regardless of the historical facts, there are some who feel oral surgery should be a recognized specialty of medical practice, the preparation for which should be on the same basis as in other surgical specialities of medicine.

Oral surgery has been taught in the past, as it is at present, as part of the dental curriculum. It requires first of all an intimate and thorough knowledge of dentistry and of the abnormal and pathologic conditions seen in the mouth. In this particular field, the training given far surpasses that of the medical student, who usually has only a limited knowledge of what constitutes a complete oral diagnosis. Oral surgery is closely related to all types of dental service, inasmuch as surgery of the mouth frequently involves loss of teeth, with consequent impaired function, and requires careful consideration of physical, mechanical and esthetic results. It is obvious, therefore, that the dentist who has been adequately trained in the fundamental principles of oral surgery and in the application of these principles to practice is far more competent to make a correct diagnosis and render surgical service than is the physician who has had no dental training.

To differentiate between so-called minor and major oral surgery is difficult, for the extraction of a tooth, which is considered a minor procedure, may become major in every sense through complications that may develop.

Oral surgery and exodontics (a term that has become a part of dental nomenclature and is applied to the phase of oral surgery that deals with the extraction of teeth) involve the diagnosis and surgical treatment of abnormal and pathologic conditions that occur in the maxilla, the mandible, and the related structures.

The ability to make such a diagnosis and to carry out proper treatment require primarily a preparation in dentistry, although many specialists in this field have both dental and medical degrees.

Plastic surgery, as practiced by many who specialize in oral surgery, requires additional training in medicine and surgery, and involves a field apart from that included in the preparation for the specialty of oral surgery.

A standard of requirements for those

who specialize in oral surgery is constantly becoming more necessary. Many dental graduates have obtained a medical degree, but the medical degree in itself does not qualify for the practice of oral surgery. It should be possible for dental graduates who have suitable qualifications and have shown special interest and aptitude in this particular field to prepare themselves for the practice of oral surgery. Courses of advanced study and preparation in dental and graduate schools, without the necessity of spending five additional years in medicine, are now available for those desirous of practicing this dental specialty.

Such educational programs are conducted in the dental schools as an advanced course of study, strictly graduate in character, and are carried out by or under the supervision of the graduate school or the university.

The objectives of these courses are adequate training in the fundamental principles of oral surgery and in the application of those principles to the practice of this specialty. They include a definite term of graduate study following completion of the dental curriculum.

The curriculum should include advanced study in the basic sciences relating to oral surgery, roentgenology, diagnosis, anesthesia, surgical principles, and hospital routine and organization. Each student should be required to undertake at least one research problem as part of the course, the report of which should constitute a thesis to be submitted as a requirement for completion of the course.

The faculty should include not only competent teachers in the basic sciences who have an understanding of the dental implications in their subjects, but also instructors of outstanding ability in the practice of oral surgery.

The facilities for such a course of study should include adequate hospital facilities for training in hospital routine, laboratory procedures, history taking, physical diagnosis as it relates to oral conditions, and for observation of the relation of oral pathology to systemic disease. Suitable operating facilities, rooms, equipment, instruments and assistants, should be available. A good library should be a requirement, and an abundance of clinical material should be accessible.

A definite program of graduate study, recognized and conducted by dental colleges, will establish a standard of requirements for the practice of oral surgery as a specialty of dentistry. This will result in a superior service which should influence the determination of the relation of oral surgery to medicine and dentistry.

In conclusion, it should be recalled that the American Society of Oral Surgeons was organized under the aegis of the National Dental Association and has maintained a close liaison with the American Dental Association during the Society's 40 years of existence.

The Society should continue to realize that the real purpose of its establishment was to assist in the improvement of dental health services.

A second point that should be remembered is that specialties have no real existence apart from the profession which fostered them. The American Society of Oral Surgeons would, in my mind, be a futile effort were it not part and parcel of the great profession of organized dentistry.

A third point to be remembered is

that specialty societies should not lend themselves to the development of artificial economic distinctions between specialists and other practitioners of dentistry. They need to know that specialty societies will thrive only in the atmosphere of confidence and understanding within the broad scope of the dental profession itself. They need to know that their final test will rest not with standards, prestige or economic advantages for their members but on the quality of service they render to the citizens of this country.

It is hoped that in the very near future the American Dental Association will establish a mechanism under which specialty societies will be given some type of formal affiliation through representation in the Association's House of Delegates.

I have faith that the American Society of Oral Surgeons will continue to grow and protect the specialty of oral surgery as a branch of dentistry where it rightly belongs.—*Roshek Building.*

*Secretary, American Board of Oral Surgery; former president, American Dental Association.

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Treatment of jaw fractures, past and present

■ *Kurt H. Thoma,* D.M.D., F.D.S., R.C.S. (Eng.), Brookline, Mass.*

Jaw fractures, like dental caries, have plagued mankind from the beginning of recorded history. Numerous methods have evolved from the early interdental gold wires, bandages and splints to the elaborate skeletal fixation appliances available today.

However, an older method, open reduction, remains as one of the easiest and best treatments, thanks to improved surgical technics and antibiotics. Regardless of the treatment employed, basic principles must be followed to restore both appearance and function.

Jaw fractures in ancient times, as well as in the more recent past, occurred in individual combat or in mass conflicts—wars—which have been with us even to the present day.

There are records of the treatment of jaw fractures that date back as far as the Old Empire of Egypt (3,000 - 2,500 B.C.). These have been reproduced in the *Edwin Smith Surgical Papyrus.*[1] Among 27 case reports of head injuries, there are several

sword cuts and arrow wounds. One describes a fracture of the mandible and three cover injuries of the cheek and underlying bones. These injuries were classified as perforations: "thm"; a split or a simple fracture, "pšn"; and smash, "sd," meaning a comminuted fracture. In each case the diagnosis and prognosis, as well as the verdict, are dealt with. The verdicts were of three kinds: "an ailment I will treat," an "ailment I will contend with," and "an ailment not to be treated."

Here is the information in hieroglyphics regarding a fracture of the mandible.

According to Breasted's translation, the advice regarding mandibular fractures is as follows: "One having a fracture of the mandible over which a wound has been inflicted (several words missing) and he has a fever from it: an ailment not to be treated."

Other old documents dealing with fractures of the jaws are found in the works of Hippocrates (400 B.C.).[2] He recommended the use of gold wire or linen thread wound around the teeth in each fragment to hold the fracture immobilized after being adjusted. He also recommended the use of bandages to repose the jaw, but warned that the inexperienced frequently displaces the fragments, that have been properly reduced, by bandaging. He stated that bandaging has a tendency to derange the bones rather than bring them into their natural position, and if the fragments unite in a bad position the teeth become useless.

■ *Use of Bandages*

The Romans also left evidence that they treated jaw fractures. Aulus Cornelius Celsus (30 B.C.),[3] the great Roman physician, in his book *De Medicina,* recommended horizontal wiring similar to that advocated by Hippocrates, but added a sling for the chin. This chin bandage had been described before by Soranus of Efesus (97 A.D.)[4] as "Capistrum simplex and duplex," and was also advocated by Galenus (131 A.D.).[5]

The Arabic school added little that was new. In general, the methods of Hippocrates were recommended. Abulcasis of Cordova (936-1013),[6] the greatest surgeon of his age, included in his book a chapter entitled, "De restauratione mandibulae inferioris, quando disrumptur." Avenzoar, according to his *Ae-Teisir,* written at the beginning of the twelfth century, depended mostly on bandages to retain the mandibular fragments in position. At this time intermaxillary wiring came into use. Guglielmo da Piacenza in 1275 in his *Praxeos Totius Medicinae* advised binding of the teeth proximal to the fracture, not only between themselves, but also to the corresponding teeth in the maxilla.

Ryff (1500-1548)[7] in his *Grosse Chirurgie,* showed an illustration (Plate 49) in which a fracture of the mandible is treated by gold wires intertwined between all the teeth. The use of bandages and slings, however, continued during this period and into the eighteenth century, as is evidenced by a rare and interesting illustration of a chin bandage (Fig. 1) taken from a book by Don Mauro Soldo (1766).

■ *Use of Splints*

The use of dental prostheses for the treatment of fractures was first recommended by Bunon (1743).[8] He used a block of ivory which he wired by means of two holes to the jaw. A more scientific method was included in Chopart and Desault's *Traité des maladies chirurgicale.*[9] They described the effects of the elevator and depressor muscles on the fragments, and recognized complications caused by loose or fractured teeth. They recommended stabilization of the reduced fragments by means of wires or by placing a cork or lead leaf over the teeth and binding them together.

In the nineteenth century wounds of the jaws and face became increasingly more frequent in the various wars that took place. Thompson,[10] surgeon to the British forces, reported that fractures of the upper and lower jaws occurred from cannon, gunshot, saber and lance, and that few healed without distortion of the face, and often showed no disposition to heal at all. Hennen (1818)[11] stated that in patients with jaw fractures, the lower jaw should be placed in contact with the upper which will serve as a splint, and that the part must be supported by a properly adapted roller placed over the fractured points.

The literature in the nineteenth century dealt with various complications as well as new methods of treatment. Direct osseous wiring came into use, according to Bérenger-Féraud,[12] and will be dealt with later.

The splint was developed during this period. Boyer (1805)[13] recommended cork splints; Wallace of Dublin (1836)[14] interposed a gloved cork placed on the posterior fragment, raising the anterior one with a bandage. Gillespie (1836)[15] adjoined a piece of sole leather between the teeth with a bandage around the head and chin. A gutta-percha splint was introduced by Hamilton (1857).[16] It became popular because when warm, the gutta-percha could be pressed over the teeth. Later the splints took on the form of metal clasps which were placed over the teeth, or were made fast by screws. Interdental splints were combined with external splints and bandages. Barton (1819)[17] introduced a new bandage made of a roller five yards long which today is still used, and is known as Barton's bandage. Hamilton also devised a new headgear shown in Figure 2, because he noticed that the ordinary bandage had the tendency to displace the anterior fragment of the jaw. Salter (1860)[18] introduced a gold denture splint as a new method of treatment, and others constructed dentures of vulcanized rubber for this purpose.

During the War of the Rebellion (1861-1865), according to Circular No. 6 published by the Surgeon General's Office in 1865, 1,579 fractures of the facial bones occurred. In a circular issued in 1870, 3,312 cases were reported, 1,617 of which were fractures of the mandible. The treatment of these injuries in the Army of the South consisted of the application of a splint (Fig. 3) devised by Dr. J. B. Bean,[19] and described by Garretson.[20] In the North, Hamilton's gutta-percha splint was used with success. Dr. Elliot, assistant surgeon of the U. S. Volunteers, stated that he preferred this splint because it could be made quickly and an aperture could be left to introduce food.

The advantages of Hamilton's splint

Fig. 1—Chin bandage used in the eighteenth century for fractures of the lower jaw (after Piperno)

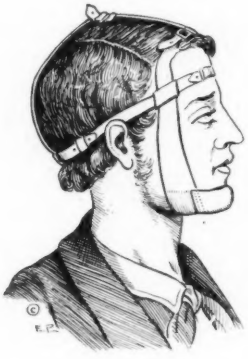

Fig. 2—Hamilton's bandage (after Garretson)

Fig. 3—Bean's splint used during the War of the Rebellion (after Garretson)

Fig. 4—Splint for mandibular fractures designed by Moriarty of Boston (Harvard Dental Museum)

were grasped promptly by the dental profession, and during the latter part of the nineteenth century and the early twentieth century, new splints were originated. This development was along the lines of prosthetic dentistry to the extent that the period could be called the "prosthetic era" of fracture treatment.

At this time horizontal and intermaxillary wiring generally was used for simple fractures. The methods of Essig (1917),[21] Gilmer,[22] and Gilmer's arches[23] were used. Orthodontic bands were devised to hold these arch wires. Angle (1890)[26] contributed much to the development of this device. The first vulcanite splint was described by Sands (1863),[24] and the Gunning splint was applied by Gunning[25] of New York in 1861. At this time numerous dental splints were devised which did not have to be attached to the upper and lower jaws, as did Gunning's splint. Very elaborate devices were constructed such as the Kingsley splint[27] and that designed by Moriarty of Boston (Fig. 4).

During World War I, facial gunshot wounds caused by high explosives and bullets, shells and grenades were very common. The surgical and mechanical ingenuity of those who treated these patients was put to a test. Ivy (1918),[28] in a collective review, stated that the metal band and wire splint were in general use, and a great many different types were described. Valadier and Whale (1917)[29] used ingenious splints at the Dublin Base Hospital at Boulogne. Gillies (1920),[30] who performed some remarkable facial restorations, included in his book a chapter on the use of prostheses written by Sir Kelsey Fry who also contributed other valuable articles to the literature.[31-33] Parrott (1918)[34] found many of the patients that arrived at the Southern General Hospital in Birmingham suffered from sepsis, and the associated trismus made the construction of splints difficult. At the Chaptal and Lariboisière Hospital in Paris, Sebileau (1917)[35] with the cooperation of Lemaire and Villain (1917), devised many appliances for the immobilization of mandibular fractures and stressed the importance of adequate retention by splints to achieve satisfactory results with grafts. Kazanjian,[36] who served with the British Expeditionary Forces and later General Hospital No. 20, wrote many articles published in English, French and American journals. He emphasized the value of various types of prosthetic appliances which he inserted immediately after the injury to support the tissues while they were still soft and flexible. One of Kazanjian's best publications is found in the War Supplement of the *British Dental Journal*.[37] McCauley and Worthley (1919),[38] who served with the U. S. Army Hospital No. 11, pointed out the value of interdental splints in instances where there was great loss of bone. They were locked with a pin and tube device which permitted rapid opening of the jaw in an emergency. As to the German side, a résumé of their publications was given by Dolamore (1916).[39] Band and bar splints were used, or metal cap splints often devised to apply traction if fragments were displaced. According to a Swiss publication, the Germans established *Kieferstationen* since they felt that better results could be obtained in special hospitals.

In the period between World Wars

I and II, with the ever-increasing use of automobiles, airplanes, and machinery in factories, more jaw fractures occurred among the civilian population. The result of the treatment had to be more carefully considered, because in many instances medicolegal complications arose with large judgments resulting if the treatment produced permanent functional debility or poor cosmetic results.

■ *Skeletal Fixation*

An entirely new approach to fracture treatment was developed just before, and became quite popular during World War II, although the basic principle had originated years before. Parkhill (1897)[40] described a bone clamp to be used for long bone fractures. Roger Anderson (1936)[41] modernized the method and produced an appliance by which the fracture fragments could be controlled by means of pins or screws inserted through the skin. Converse and Waknitz (1942)[42] reported the use of an appliance for the jaw, the construction of which they had worked out with Fairbanks and Stout; it is called the Frac-Sure Appliance (Fig. 5, 6). Other appliances were developed by Stader (1937),[43] Griffin (1941),[44] Mowlem and co-workers (1941),[45] and Clouston and Walker (1943).[46] External fixation by means of a hook screw (Fig. 7) was described by Penn and Brown (1943).[47] Thoma (1945)[48] recommended a peripheral bone clamp, which is especially useful to control a posterior edentulous fragment (Fig. 8).

Skeletal fixation has many advantages. It makes prompt reduction and fixation possible without the time-consuming delay caused by construction of a splint. In war casualties the patient may be transported after the fracture has been reduced without endangering his life from sea or air sickness. The method allows the use of the jaw which eliminates the preparation of special liquid diets. Moderate use of the jaw also makes for quicker healing, and Mowlem and co-workers pointed out that it facilitated oral hygiene and the treatment of oral lacerations and prevented stiffness of the joint and muscular trismus.

The indications for the use of this method were discussed by Waldron, Kazanjian and Parker (1943).[49] They recommended it for fractures of the edentulous jaws, badly displaced fractures of the mandible, fractures at the angle of the jaw, fractures with loss of bone that require grafting, in mixed fractures to fix the mandibular fracture so it can be used as a splint for the maxillary one. In pathologic fractures, caused by cysts and tumors, or in osteomyelitis of the fracture ends, it can be used to advantage if the pins are inserted a distance away from the affected region.

Bradford and Wilson (1947)[50] gave two good rules to prevent misuse of the method:

1. The apparatus should be applied only by an experienced oral surgeon who thoroughly understands the principles involved.

2. The method should not be used routinely, but should be applied only when simple conservative methods seem inadequate.

Clamp fixation has additional advantages. The Brenthurst clamp splint recommended by Penn and Brown may be applied at the inferior border as far as the

condyle without injury to any anatomical structures (Fig. 7). Since it does not open any fascial planes it does not tend to spread infection, and there is no chance of injury to a tooth or to the inferior dental nerve, or of a bone burn, since it is applied to the external surface of the bone only. It may be used in a child when other methods are difficult and pin insertion may injure unerupted teeth.

The Thoma peripheral bone clamp, although inserted beneath the skin, has similar advantages. It may be used in instances of central bone infection and can be combined with pin fixation. The ramus, which is thin, is controlled by the clamp while the anterior fragment is held by pins (Fig. 8). Clamp fixation is eminently suitable in instances where prolonged fixation is required, such as those needing bone grafts, or to hold the fragments apart after resection of a segment containing a tumor so that the oral tissues may heal before restoration by means of a bone implant is attempted.

■ *Open Reduction and Internal Fixation*

Open reduction and internal fixation of mandibular fractures is said to have been practiced by ancient doctors in Algiers. It had been used for the treatment of jaw fractures by Brainard of Chicago (1854),[51] Cooper (1862),[52] Kinloch of Charleston (1854),[53] and Rickerstech of Liverpool (1864),[54] but came into disrepute because frequently osteomyelitis set in, as was pointed out by Ivy (1922)[55] and Berger (1927).[56] In spite of this, Rodgers, Hall and Shackelford (1932)[57] revived the method, but Waldron (1942)[58] wrote that postoperative infection, necrosis, sequestration and nonunion occurred so often that the method should be abandoned. These failures were probably largely due to the metal of which the wires were made, since tissue irritation resulted, and because most fractures were compounded into the mouth by an involved tooth or a gingival laceration. With the use of antibiotics and new metal such as stainless steel, Vitallium and tantalum, the surgical method has again found new advocates who have applied it enthusiastically, especially for the treatment of fractures which in the past were difficult to control. The surgical approach, as a matter of fact, has supplanted the use of splints in many civilian hospitals where a technical laboratory and technicians to construct complicated prosthetic appliances are not available, as they are at special maxillofacial centers and military establishments. In those institutions, however, splints are still used a great deal, as is evidenced by a review of the excellent text on maxillofacial injuries by Fry and Ward (1956).[59]

The modern methods of open reduction and internal fixation give excellent results. The technic is especially indicated in cases of marked displacement of the fragments, fractures with interposition of soft tissue or bone, and all cases in which the results of fixation by other means is uncertain. The method should be resorted to in the treatment of nonunion, fibrous union, and revision of a fracture in which malunion has caused deformity and malocclusion.

CIRCUMFERENTIAL WIRING—Circumferential wiring, although not belonging entirely in this classification, is mentioned

Fig. 5—Roger Anderson splint for fracture at symphysis

Fig. 6—Roger Anderson splint for bilateral mandibular fractures

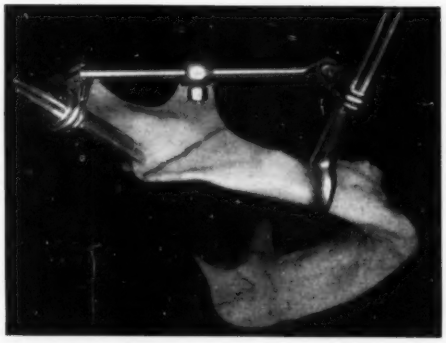

Fig. 7—Brenthurst clamp (courtesy Major Jack Penn, Johannesburg)

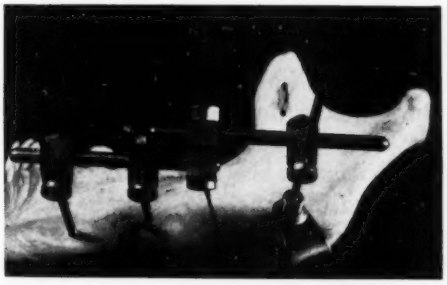

Fig. 8—Roger Anderson splint combined with Thoma's bone clamp

here because it is one of the older accepted methods which still can be recommended for the fixation of certain fractures today. Since it can be used without performing an open reduction simply by puncturing the skin with a curved needle for the insertion of the wire, it at once became popular. The method was advocated by G. V. Black and described by Ivy (1922),[60] and was recommended by many other writers. The wires are placed around the mandible and twisted over a denture. Since stainless steel has come into use, the method has also been advocated to hold together horizontal and oblique fractures with or without a splint (Fig. 9). Various technics of circumferential and transcircumferential wiring are described in my book *Oral Surgery*.[61]

TRANSOSSEOUS WIRING—Transosseous wiring of the fracture reduced by an open procedure is the simplest method for fixation and is excellent for the attachment of bone grafts to the mandible. The principle of wiring is to draw the fragments together and hold them in position in such a manner that displacement is not possible (Fig. 10). At first, wires were placed through an intraoral approach into the alveolar part of the bone, as advocated by Kazanjian (1933),[62] and were left to protrude through the mucosa for easy removal. However, with the advent of chemotherapy and inert metal wire, the wiring was combined with open reduction and applied at the alveolar border. This method, therefore, can be used for dentulous as well as edentulous fragments of the mandible. It is particularly recommended for fractures at the angle of the jaw, for the treatment of which a great many procedures have been used, all quite unsatisfactory (Fig. 11).

The placement of the wires requires some careful consideration to prevent overriding or slipping of the fragments. Figure 12 shows various technics. In general one transosseous wire at the inferior border is adequate, generally a horizontal one, sometimes a vertical one. In oblique overriding fractures a short transcircumferential wire may give good results. In rare cases of fractures of the ramus, extending posteriorly, a transcircumferential wire inserted from the mouth has been found useful.

METAL BONE PLATES—Metal bone plates may also be used for fixation of the fragments. These were pronounced unsatisfactory for jaw fractures by early writers such as Berger (1927).[56] J. B. Murphy[63] is cited as having made the statement that of the bone plates he had used himself on jaws, eight out of every ten he put in had to be removed by himself, and he added, he did not know who took out the other two.

Here again the inert metal and antibiotics have made the use of this procedure not only possible but very satisfactory. As in wiring, if local infection is present, metal bone plates are unsuitable, but if there is no infection present, practically 100 per cent of the fractures heal without complications.

It should be remembered that a bone plate does not draw the fragments together. Its ideal use is to hold them apart so that bone chips can be placed around them and between them to stimulate osteogenesis (Fig. 13). If greater bone loss has occurred, a longer metal plate is ap-

Fig. 9—Circumferential wiring over alveolar splint

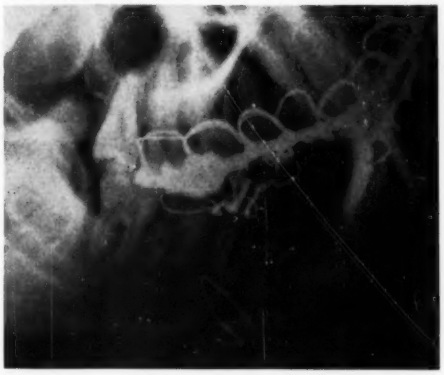

Fig. 10—Transosseous wiring of oblique fracture

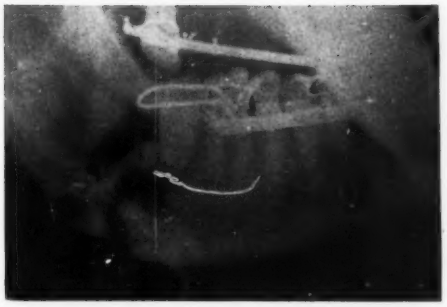

Fig. 11—The use of splint with extension over an involved tooth to depress posterior fragment resulted in osteomyelitis

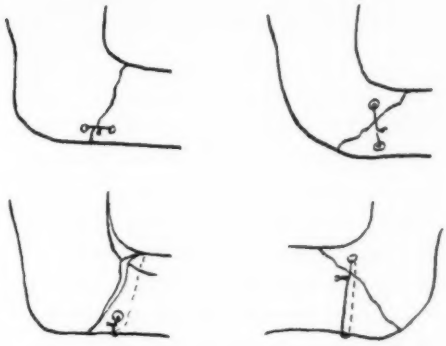

Fig. 12—Various methods of internal wiring fixation. Above left: Horizontal transosseous. Above right: Vertical transosseous wiring. Below left: Transcircumferential wiring for oblique fractures. Below right: Transcircumferential wiring for fractures of ascending ramus

plied for the insertion of a larger piece of bone.

The bone plates available are so-called digital plates and Lane plates made of Vitallium, stainless steel or tantalum. It is important that the screws be of the same material.

BONE GRAFTS—Bone grafts, especially rib grafts, may be applied not only to lengthen the jaw but also to stabilize the fragments.[64] In such cases ½ to ¾ inch of each fragment should be decorticated and the split rib should be applied and held secure with stainless steel transcircumferential sutures (Fig. 14) or mattress sutures (Fig. 15).

In all these instances, immobilization of the mandible is imperative. The only disadvantage of this method is the scar which is almost invisible after a few months, with a well placed incision, careful suturing with atraumatic Dermalon, and pressure packs applied over the wound.

■ *Internal Wiring Fixation of Maxillary Fractures*

For stabilization of maxillary fractures, bandages were first used. Goffres (1862)[65] used a headband with two arms extended over each side of the nose, and so bent as to enter the mouth for support of the incisor region. Ferraton (1909)[66] described a more complicated splint consisting of a headband with two metal rods extending into the mouth to engage a rubber splint made for the upper jaw. This was similar to what is known in this country as the reversed Kingsley splint. Kingsley (1880)[27] devised a splint which was constructed by vulcanizing a tube into each side of a rubber splint. Wires inserted into the tubes extended from the mouth and bent back to follow the outside of the cheek, and to them was attached a bandage extending over the head. Various appliances for craniomaxillary fixation have been devised since. They are attached either to a plaster skull cap described by Scogin (1930),[67] or a headband as described by Woodard (1938),[68] Bisnoff (1943),[69] shown in Figure 16, England (1951),[70] and many others. An excellent review of 150 patients with maxillary fractures treated in an overseas maxillofacial center has been reported by Clark (1945).[71] The article contains a description of the many complications which may occur in maxillary fractures and their treatment.

Because many of the headgears described did not always effect satisfactory immobilization and were subject to adjustment or maladjustment by the patient, other methods have been developed.

Craniofacial wiring was described by Dingman (1939),[72] by Erich (1942),[73] (Fig. 17), and by Bradley (1951).[74] The wires extended from a plaster headcap and entered through the cheek to a splint attached to the upper jaw.

Internal wiring fixation was resorted to because, as has already been mentioned, many difficulties were encountered with the use of the previous methods. Of these, the unsightly appearance and the difficulty in adjusting to a position for sleeping were major factors.

Adams (1942)[75] described two methods, one for horizontal maxillary fractures for the fixation of which a wire is looped through the infraorbital margin (Fig. 18) and attached to an arch wire

Fig. 13—Lane plate used to hold fragments apart to interpose bone chips

Fig. 14—Rib graft attached to decorticated and drilled mandible by means of transcircumferential wires (postoperative view)

Fig. 15—Rib graft to replace large segment of mandible attached by means of one vertical and two horizontal mattress wires showing healing of graft

splint; the other for transverse facial fractures for which the wire is looped through a hole drilled in the lateral margin of the supraorbital ridge and passed behind the malar processes into the oral cavity (Fig. 19).

Lesney (1953)[76] recommended still another method requiring no skin incision or bone drilling. The wire was looped around the zygomatic arch with a curved skin suture needle; it entered the vestibule and was attached to the dental splint.

■ *Internal Wiring Fixation of Condylar Fractures*

One of the earliest discussions on condylar fractures is found in the French literature. Desault (1805)[77] already had recognized that these fractures might occur not only because of a direct blow, but

Fig. 16—Craniomandibular fixation of maxillary fracture with Bisnoff's appliance (From Bisnoff, H.L. Am. J. Orthdont. & Oral Surg., 1943)

Fig. 17—Craniomaxillary fixation by Erich's method

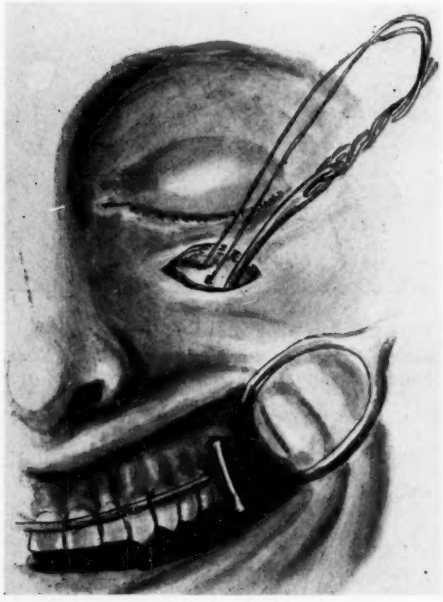

Fig. 18—Adam's method of internal fixation of horizontal maxillary fractures

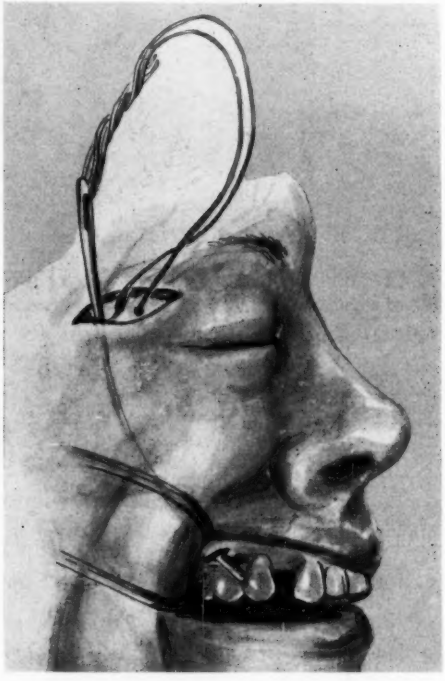

Fig. 19—Adam's method of internal fixation of transverse maxillary fractures

also through an indirect one, when the anterior part of the jaw was struck. He advised careful reduction to prevent later functional difficulties by pulling the ramus forward, since pulling the condyle back was impossible. Fountain (1860)[78] recommended that the front teeth of the lower jaw be wired to the upper to draw the chin forward and maintain apposition of the fragments.

No great progress in the treatment of condylar fractures was registered in the literature until Rüedi (1928)[79] and Dufourmental (1929)[80] made a comprehensive study of these injuries. The various types of these fractures had not been recognized until new roentgen methods, permitting exposures from various angles, had been developed. Then a classification could be presented.[81] The recognition of the various types is important in order to accomplish an anatomical restoration of the condyle fragment, or to decide whether a certain fracture may be treated conservatively or should be treated surgically. The most important types are the simple fracture, the fracture dislocation, and the complete displacement of the condylar fragment. Subdivisions are less important, although a recognition of the intracapsular and extracapsular fractures has some value.

A great many writers on the subject claim that the anatomic positioning of the condylar fragment is unimportant. They feel that the important part is to obtain occlusion by intermaxillary fixation or the use of traction without positioning the condylar fragment.[82] If there is considerable open bite, various methods of overcorrection by placing a wedge between the teeth have been recommended. Even in fracture dislocations they expect a good functional result by a rebuilding of the condyle and the joint fossa as well. Others,[83, 84] and the fact that there are some who are not satisfied with intermaxillary fixation indicates that the results are not good in all cases, recommend functional treatment. Walker,[85] however, stated that such treatment may lead to the formation of a false joint, and I have actually seen such a case.[86] The patient complained of limited motion and pain.

Other instances in which poor results were obtained and functional difficulties developed have been reported in the literature.[81, 87, 88] Pain, restriction of motion, open bite, and even ankylosis occurred after conservative treatment. Risdon (1934)[88] stated that 5 per cent of the patients treated developed ankylosis, and Gruber and Lyford (1942)[89] stated that of ten patients treated by intermaxillary fixation for six weeks, three had appreciable loss of function, malocclusion, and deviation of the mandible, two developed ankylosis, and the remaining five had minimal disturbances. The conclusion is that with the exception of simple condylar fractures without much displacement of the fragments or dislocation of the condyle, open reduction and internal fixation is desirable. Wassmund (1934)[90] and Steinhardt (1936)[91] recommended wiring, especially for fracture dislocations.

The preauricular approach which Risdon (1934)[88] has recommended for use in arthroplasty was advocated by Thoma (1951)[92] for the wiring of subcondylar fractures and by Henny (1951)[93] for fractures through the neck of the condyloid process. Henny recommends the use of a muscle relaxant to improve retrac-

Fig. 20—Fracture dislocation of condyle

tion by means of which the condyle may be approached without restriction by the facial nerve, a handicap when the preauricular method is used.

With both these methods, excellent results can be obtained. Figure 20 shows a fracture dislocation. The immediate postoperative result is shown in Figure 21. The closed and open positions shown in Figure 22 are evidence of excellent function 12 years later. The operation from a submandibular approach can be recommended also for the reduction of condylar fractures in children. The importance in the growing child of the growth center located in the condylar part of the jaw is today generally recognized, and an anatomic restoration therefore is important to prevent underdevelopment of the affected side. My associate, Daniel J. Holland, has used the method on children aged 3½, 7, 10½ and 16 years old. The postoperative view of the youngest child is shown in Figure 23.

Internal wiring should also be used for subcondylar fractures, especially if complications are present (Fig. 24).

■ *Methods of Immobilization of Jaw Fractures*

In multiple fractures, immobilization of the fracture often presents quite a problem. Intermaxillary fixation by the Gilmer method,[22] the methods of Eby[94] and of Ivy [55] are well known, as is Stout's wiring described by Harper,[95] and the Risdon method (Fig. 25). Arch wires fastened to the teeth for the application of elastics are available; the Winter, the Jelenko, and the Niro splints (Fig. 26) are easily ap-

Fig. 21—Reduction and wiring fixation (postoperative)

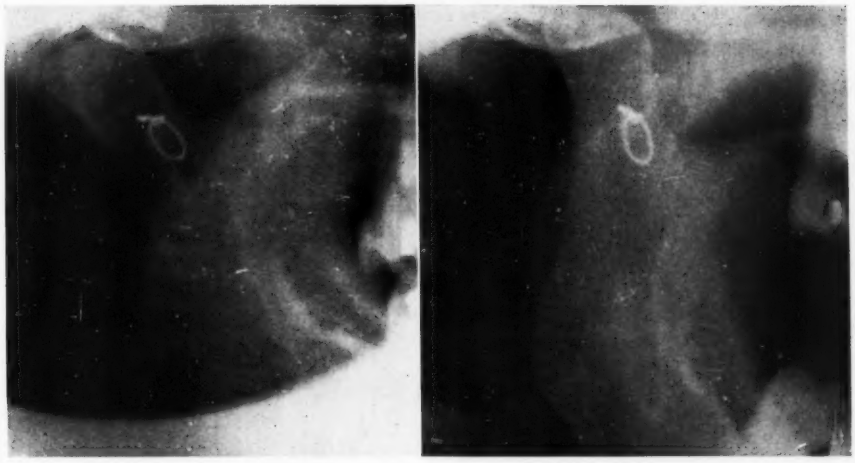

Fig. 22—Same patient showing result after 12 years (closed and open position)

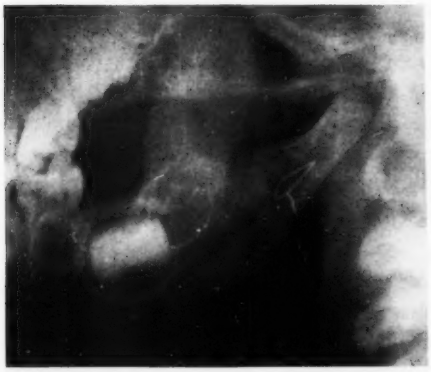

Fig. 23—Fracture dislocation in 3½ year old child reduced and wired by submandibular incision (courtesy Daniel J. Holland)

Fig. 24—Subcondylar fracture reduced by submandibular incision

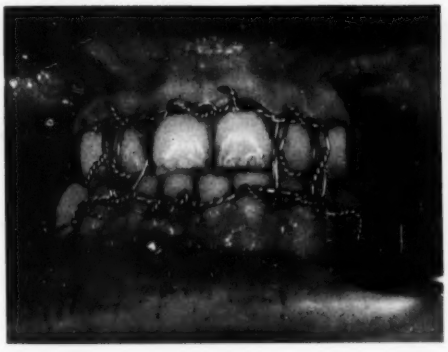

Fig. 25—Intermaxillary fixation with Risdon wiring

Fig. 26—Intermaxillary fixation with Niro splints

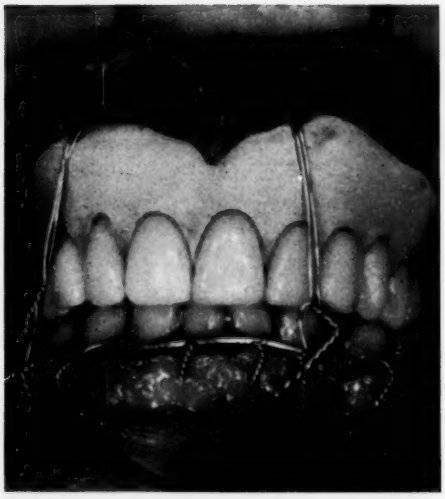

Fig. 27—Nasomandibular fixation to arch wire attached to lower incisors with upper denture interposed

plied and are all useful alone or in combination with other methods.

The nasomandibular method of immobilizing the mandible against a complete upper denture by drawing wires through the margin of the piriform aperture of the nose and attaching them to an arch wire fastened to the mandibular teeth was described by Thoma (1943.)[96] It is shown in Figures 27 and 28. The intermaxillary retention of an upper and lower denture or a Gunning splint by the same kind of nasal wire fastened to circumferential mandibular wires[97] is illustrated in Figures 29 and 30.

■ *Ten Commandments*

The aim of fracture treatment is to restore both appearance and function. Although the patient's happiness depends considerably on facial appearance, the ability to masticate food properly, to speak normally, and to be able to open the mouth in order to have the teeth attended to is also important. The treatment, therefore, must restore normal occlusion so the patient can eat. If the inferior alveolar nerve has been injured in mandibular fractures and numbness has resulted, it is important to get accurate apposition of the fragments so the nerve can regenerate. If there is blindness or double vision in maxillary fractures, or numbness due to injury of the infraorbital nerve proper, early reduction will often restore their function. Normal joint function should be the aim so that the patient can perform jaw movements adequately without pain as soon as the muscular trismus resulting from prolonged immobilization has been overcome.

The following are ten commandments to be observed in the treatment of fractures of the jaws which have been discussed in greater detail previously:[98]

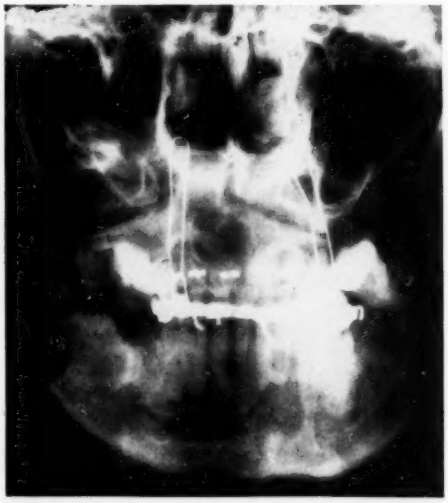

Fig. 28—Nasomandibular wiring

Fig. 29—Nasomandibular wiring with Gunning splint interposed and attached to mandible with circumferential wires

Fig. 30—Nasomandibular wiring with bone graft inserted. Acrylic resin Gunning splint is radiolucent

I. Treat the patient.
II. Attend to soft tissue wounds.
III. Make a careful clinical examination.
IV. Determine the type and exact location of the fracture by roentgenographic examination.
V. Prevent and treat infection.
VI. Secure temporary immobilization.
VII. Choose the correct type of anesthesia.
VIII. Give attention to proper reduction.
IX. Select the best method of fixation.
X. Give proper attention to aftercare.

1146 Beacon Street

*Professor of oral surgery, Boston University Medical School; professor emeritus of oral surgery and of oral pathology, Harvard University.

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Anesthesia: history's answer to man's need

■ *Marvin Revzin, D.D.S., Detroit*

Anesthesia developed in response to man's need to be free from pain due to illness and surgery. Its discovery and growth occurred when man's environment was ripe for its development. This article traces anesthesia from a superstition to a science.

The history of mankind is long. The history of modern anesthesia is short. Although recorded history of man generally dates from about 5,000 B.C., it was not until the nineteenth century that anesthesia was employed consciously and consistently for the relief of pain. The development of anesthesia, therefore, was not one constant, upward swing climaxed by our present knowledge of the subject. Rather, its growth may be likened to that of a river which began as a drop of water in some rocky faraway place, to which was added a few drops and still more drops until a small stream was formed which meandered haphazardly toward becoming the cascading river which it is today.

The history of anesthesia, like all history, must concern itself with people, places, environment, philosophy, religion, science and chance, for all these and more are involved in any civilization. The technics, the inventions and the processes are the products of the past to which we are heir and which we assimilate, improve and pass on to the future. "No civilization is static. . . . Inside each may be seen periods of growth, expansion, development, and alteration. . . . This concept of society as dynamic, moving, creating, struggling, even decaying, but ever changing, is basic to the understanding of any history whether that history be recorded

in the clay tablets of Babylon or in this morning's newspaper."[1] "The question of what men do with techniques is as important in determining the nature of civilization as are the techniques themselves."[2] The reasons for reading and understanding history become clearer when we realize our debt to the past and our obligation to the future.

It has been said that history is a record of the deeds of great men, good and bad, that the discoveries in science and inventions and the great works of art and philosophy are the work of geniuses. However, Leslie A. White in his challenging book *The Science of Culture*[3] maintains that "(1) No invention or discovery can take place until the accumulation of culture has provided the elements—the materials and ideas—necessary for the synthesis and, (2) when the requisite materials have been made available by the process of cultural growth or diffusion, and given normal conditions of cultural interaction, the invention or discovery is bound to take place."[3] It will be seen that the nearly simultaneous discoveries of anesthetic agents and technics were bound to occur when they did because the environmental climate was ripe for the development of some practical means of avoiding pain during surgery.

Pain is older than mankind, and man's revolt against it has been slow. Pain is a Janus. Its one face, which is rarely appreciated, is a sentinel which alerts and protects the body against harm from disease or injury. It awakens an awareness which helps a person fight the various threats to life. Its other and more familiar face has caused man misery since time beyond memory. Why has man been so slow in his scientific investigation of pain, even after he has learned to control it? Bonica[4] stated the reason admirably:

> Perhaps the most important factors which have stood in the way of the scientific investigation of pain have been three of the most sublime forces of the human mind—religion, philosophy, and humanitarianism.
>
> For centuries religious sentiment inhibited the elucidation of the pain phenomenon, and even its control. Since the time of the Old Testament, pain has been considered a disciplinary measure for the sinners and a trial for the just. With the advent of Christianity, pain came even more definitely to be regarded as a means of enlightenment, of obtaining grace, or as a sacrament. Thus the religious devotees, martyrs and saints voluntarily accepted pain in an eager attempt to share the sufferings of Christ. This same acceptance, this same affirmation of physical pain underlay all Oriental as well as the various Western religions. Because bodily pain was thus regarded as a trial, a grace, and a sacrament or punishment meted by God and it was considered "good for the soul," it was withdrawn from scientific research and any activity intended to abolish it was inhibited.
>
> The teachings of Aristotle, Plato, and other ancient philosophers that pain was purely an emotional process, "a passion of the soul," were accepted for 2000 years. . . . Moreover when philosophy entered into the religious tradition, it took over with other doctrines the religious attitude toward pain, so that most philosophers no less than the saints, considered pain to be a moralizing agent.
>
> With religion and philosophy, the two chief "guardians of the threshold" which obstructed an insight into the world of pain, there was a third obstructing factor, humanitarianism in the form of sympathy. What physician would dare to withhold measures to relieve pain or to induce it experimentally for the purpose of investigating it?

M. H. Armstrong Davison takes exception to statements usually found in chapters or histories of anesthesia which

generally say, "From earliest times, man has sought to prevent pain." He states:

> We have only to look back 200 years, and we see that the general tendency of mankind was to inflict pain, not to prevent it. The social history of England at that time discloses a treatment of malefactors, of lunatics, of slaves and of animals which was barbaric in the extreme; and there is no reason to believe that uncivilized people are less brutal than we were in England at a date when the arts flourished more luxuriantly than at any other period in our history. . . . History teaches us that man has usually been tolerant of pain especially in others; and this is very natural.[5]

It was not until after the Renaissance with its enlightenment and the accompanying revival of learning and the development of scientific thinking that the cultural milieu was ripe for the discovery of anesthesia. As Davison put it ". . . as soon as anaesthesia became a moral necessity and knowledge and the tools being available, the discovery could not long be delayed."[5]

What had taken place up until the nineteenth century? Where were the developmental factors which must have led to the subsequent discovery of anesthesia in the mid-nineteenth century? In the ancient world of early Egypt, China, Greece and Rome, medical development and scientific learning had a certain air of magic about them, so that although some herbs and plants were used for the alleviation of pain, all these were used in conjunction with rites to placate the angry gods or to chase the demons from the body. Truly, medicine was still close to the witch doctor at this time. Numerous references are found in much of the ancient literature in regard to the use of henbane, mandragora and hemp for their pain-relieving effect; however, in each instance these were used as magic potions rather than as drugs. The use of opium for the relief of pain was first described in the writing of Theophrastus in the third century B.C.[6] Other famous physicians such as Hippocrates, Dioscorides, Pliny and Hua T'o contain many references on the use of drugs for the relief of pain. But most of this work was empiric in nature and had little scientific fact on which to be based.

Slowly the waves of knowledge advanced and receded and advanced again. The golden age of Greece gave way to the power and authority of Rome which in turn gave way to the Holy Roman Empire and the so-called dark ages. An occasional light shown brightly in the field of medicine and in the art of pain relieving, but was quickly dimmed and soon forgotten under the weight of authority of the ancient Greeks, the Aristotelian philosophy and the Church. The ancients understood the use of alcohol as a mild anesthetic agent, and the use of cold to produce anesthesia had been reported. The use of pressure to certain arteries to cut off the circulation of the part being operated on was also understood. Most of the European doctors knew that the several drugs already mentioned had weak pain-relieving properties. But the ground was not yet fertile to produce the true anesthesia as it is known today, and this knowledge died or remained dormant.

Events in fields other than anesthesia continued to lay the groundwork for its eventual discovery. Probably an impetus for this discovery began during the Renaissance with the use of movable type in 1454 which Gutenberg brought to western civilization, and thus the influence of

reading and literature became important in the art of communication. One of the first medical books in Latin was *De re medicina* written by Celsus about 30 A.D. Original thinkers such as Leonardo da Vinci, whose contributions to art were based on keen observation and not on antique views and whose drawings of anatomy began to influence scientists of the time, did much to break with authority of the past. Paracelsus, whose defiance of the authority of the ancients and whose dependence on experience did much to further the Renaissance in medical thoughts, wrote *Paradoxa* (published 1605) in which he described the action of *oleum vetreoli dulci* (diethyl ether) on chickens. Paracelsus stated that "it quiets all suffering and relieves all pain."[7] At about the same time Valerius Cordus described a method for the synthesis of diethyl ether.

Continuing in the overthrow of authority was the weakening of the Pope's rule by the onset of the Protestant separation from the Church. The authority of Aristotle was formidably defeated and the way was paved for deduction and reasoning to take the place of doctrine. One of the most important discoveries was that made by William Harvey in 1628 when he described in *Exercitatio anatomica de motu cordis et sanguinis* the circulation of blood which laid the foundation for modern physiology in medicine. In this period men such as Copernicus, Martin Luther, Ambroise Paré, Vesalius, Descartes, Kepler, Galileo, Milton and Rembrandt helped pave the way for a new knowledge and a new philosophy which made scientific discovery inevitable.

In the period immediately preceding the true discovery of anesthesia, the need for its discovery became even greater. Great changes had taken place in men's hearts and minds. Humanity became a cherished and more important factor in the lives of people. Industrial revolutions on the continent and particularly in England had changed the way of life for millions, and democracy at last began to flourish. With it came an interest in the welfare of others which began to influence the men of science as well as those of the general walk of life.

In 1754 Joseph Black announced the discovery of carbon dioxide and also laid the foundation of the atomic theory by showing that a given weight of calcium carbonate always yielded a definite quantity of carbon dioxide, which could in turn be united with calcium hydroxide to form the original quantity of calcium carbonate. In 1772, Joseph Priestley discovered nitrous oxide, and a few years later both he and Scheele announced the isolation of oxygen.[8]

Joseph Priestley is shown in Figure 1.

Sir Humphrey Davy in 1799 described the potential capabilities of nitrous oxide as an analgesic agent in his "Researches, Chemical and Philosophical, Chiefly Concerning Nitrous Oxide or Dephlogisticated Nitrous Air and its Respiration." The remark appears "As nitrous oxide in its extensive operation appears capable of destroying physical pain, it may probably be used for advantage during surgical operations in which no great effusion of blood takes place." It seems strange that this investigator should have let the matter rest with this one description. For it was some 40 years later that nitrous oxide was finally used as an analgesic agent in its true sense. This was

a period of great upheaval. The American Revolution and the French Revolution took place, the works of John Hunter and his brother William Hunter were published, Beethoven and Edward Jenner were on the scene and so was Napoleon Bonaparte. Mendelssohn, Chopin and the battle of Waterloo were persons and events of importance during this period.

Before leaving the preanesthetic period consideration must be given to the great contribution of F. W. A. Sertürner who in 1806 announced the isolation of morphine. This of course was important not only for its own sake but because it began the search for the isolation of the active principles which morphine contained to alleviate pain. Thus, the way had been prepared for the emergence of the final stages of discovery of anesthesia in its true sense, in its use to alleviate pain from surgical procedures and from illness which besets man. The next period will deal with the discovery of inhalation anesthetics as well as the discovery of the various other drugs and agents to relieve pain.

■ *Discovery of Anesthesia*

There were four principal claimants to the discovery of the method of surgical anesthesia. These were Long, Wells, Morton and Jackson. A bitter and very distasteful period ensued, with accusation and counteraccusation regarding the priority of one over the other in the development of surgical anesthesia. Who then was the discoverer of surgical anesthesia?

As stated by Dr. White in *The Science of Culture,* when the conditions are ripe for an invention or discovery to occur, it will occur regardless of the man or men at the particular time. The men themselves merely become an instrument for the implementation of the discovery. To quote further from Dr. White:

> . . . the discovery of sunspots was made independently by at least four men in a single year: by Galileo, Fabricus, Scheiner, and Harriot, in 1611. The parallax of a star was first measured by Bessel, Struve, and Henderson working independently in 1838. Oxygen was discovered independently by Scheele and Priestley in 1774. The solution of the problem of respiration was made independently by Priestley, Scheele, Lavoisier, Spallanzani and Davy in a single year, 1777. Invention of the telescope and thermometer each is claimed by eight or nine persons independently and at approximately the same time. . . . one could go on indefinitely. When the growing interactive culture process reaches a certain point an invention or discovery takes place.[9]

Although it is not too important at this time to determine or to attempt to settle the controversy as to who was the exact discoverer of surgical anesthesia, the story itself, although familiar, is an extremely interesting one, particularly for those in dentistry. In the last half of the eighteenth century and the first half of the nineteenth century, it was fashionable for young people to engage in the laughter and hilarity which was brought on by ether and laughing gas parties (Fig. 2, left). These took the form of some harmless entertainment much as cocktail parties do today. Out of the hilarity of these "ether frolics" came the recognition that while the patient was under the influence of the inhaled gas, cuts and bruises and painful injuries of all kinds apparently went unnoticed. Crawford Long as well as Horace Wells recognized the significance of this fact and both in their own

way employed this knowledge. Dr. Long as early as 1842 was known to have employed ether while removing a small tumor from a man's neck.

Dr. Wells' contribution is well summarized by Harry Archer in several of his notable contributions to the history of anesthesia. "Dr. Wells of Hartford, Connecticut, a warm, sympathetic, conscientious young dentist, was a very sensitive person. The suffering he caused when he extracted teeth troubled him greatly. Tooth extraction was so excruciatingly painful that again and again in history, teeth have been deliberately pulled as a form of torture or punishment. Horace Wells gave considerable thought to the subject of pain relief during extractions and discussed the subject with chemists and physicians of his town. Constantly enlarging his knowledge, he attended a lecture on chemical phenomena by G. Q. Colton, a traveling chemist, on December 10, 1844 (Fig. 2, right). As part of his demonstration, Colton manufactured some nitrous oxide and to amuse the crowd, invited spectators from the audience to come forward and inhale the 'laughing gas fumes.' When this part of the lecture was reached, Wells and the audience observed that no sign of pain was exhibited when the volunteers under the influence of the gas stumbled around the stage and skinned their shins on the heavy benches. Immediately there crystallized in his mind the idea of inhalation in anesthesia."[10] Dr. Wells was tremendously excited, and on the very next morning he received nitrous oxide for an extraction. John Riggs, who was his assistant in his office performed the extraction, with Dr. Colton giving the gas, a larger quantity than anyone else had ever before inhaled. After insensibility had been effected, a molar was extracted from Dr. Wells' jaw with no pain whatever on the part of the patient. A great event had taken place. It was a momentous occasion. After this, Dr. Wells and Dr. Riggs used the gas frequently for the painless extraction of teeth, and it would appear that much general interest in the subject of anesthesia prevailed about this time. After this glorious triumphant moment, the rest of Dr. Wells' life story is distressing.[11] In 1845, he went to Boston and with John C. Warren's aid arranged to demonstrate the use of nitrous oxide before the physicians of the Massachusetts General Hospital. The story of his apparent failure is well known.

William T. G. Morton had studied dentistry under Horace Wells and subsequently was a partner in the practice of dentistry with him. At one period he came under the influence of Charles T. Jackson, a chemist and physician, where undoubtedly the idea of using sulfuric ether as an inhalation agent originated. Dr. Morton continued to give considerable thought to the subject of pain control particularly while extracting teeth and had extracted a number of teeth while the patient was under the influence of ether. Once again the amphitheater of the Massachusetts General Hospital in Boston was the site for a demonstration. The surgeon in charge was once again Dr. Warren, who gave permission for the demonstration to begin. On October 16, 1846, before an audience in the Hospital amphitheater, the patient, a young man named Gilbert Abbott, was successfully anesthetized with the ether vapor introduced by

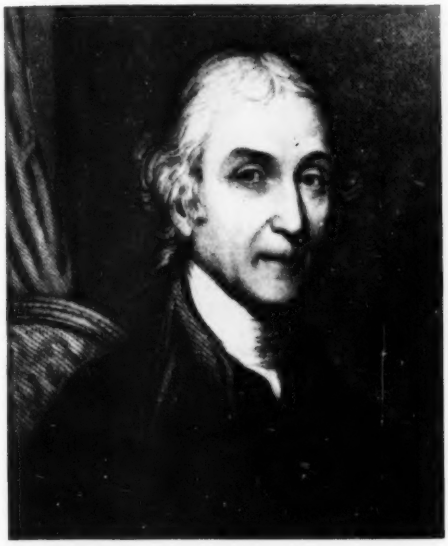
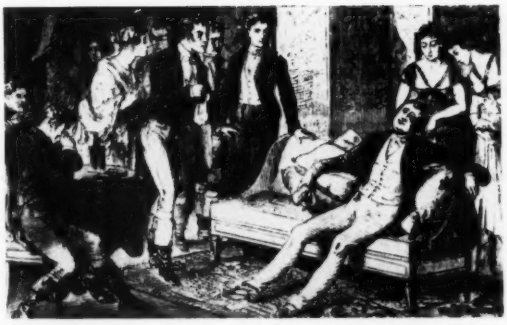


Fig. 1—Joseph Priestley, the discoverer of nitrous oxide in 1772. (Illustration courtesy of Abbott Laboratories)



MARINE LIST.

PORT OF HARTFORD.

ARRIVED.

Dec. 6. Steam Schr. Uncas, Mills, New York.
Sloop Belle, Brooks, Albany.
" Merchant, Babcock, New York.

SAILED.

9. Steam Schr. Mohawk, Clark, New York.

A GRAND EXHIBITION of the effects produced by inhaling NITROUS OXIDE, EXHILARATING or LAUGHING GAS! will be given at *UNION HALL, THIS (Tuesday) EVENING, Dec.* 10th, 1844.

FORTY GALLONS OF GAS will be prepared and administered to all in the audience who desire to inhale it.

TWELVE YOUNG MEN have volunteered to inhale the Gas, to commence the entertainment.

EIGHT STRONG MEN are engaged to occupy the front seats, to protect those under the influence of the Gas from injuring themselves or others. This course is adopted that no apprehension of danger may be entertained. Probably no one will attempt to fight.

THE EFFECT of the GAS is to make those who inhale it either Laugh, Sing, Dance, Speak or Fight, &c., &c., according to the leading trait of their character. They seem to retain consciousness enough to not say or do that which they would have occasion to regret.

N. B. The Gas will be administered only to gentlemen of the first respectability. The object is to make the entertainment in every respect a genteel affair.

MR. COLTON, who offers this entertainment, gave two of the same character last Spring, in the Broadway Tabernacle, New York which were attended by over four thousand ladies and gentlemen, a full account of which may be found in the New Mirror of April 6th, by N P. Willis. Being on a visit to Hartford, he offers this entertainment at the earnest solicitation of friends. It is his wish and intention to *deserve* and receive the patronage of the first class. He believes he can make them laugh more than they have for six months previous. The entertainment is *scientific* to those who *make* it scientific.

Those who inhale the Gas once, are always anxious to inhale it the second time. There is not an exception to this rule.

No language can describe the delightful sensation produced. Robert Southey, (poet) once said that "the atmosphere of the highest of all possible heavens must be composed of this Gas."

For a full account of the effect produced upon some of the most distinguished men of Europe, see Hooper's Medical Dictionary, under the head of Nitrogen.

MR. COLTON will be the first to inhale the Gas.

The History and properties of the Gas will be explained at the commencement of the entertainment.

The entertainment will close with a few of the most surprising CHEMICAL EXPERIMENTS.

Mr. COLTON will give a private entertainment to those Ladies who desire to inhale the Gas, TUESDAY, between 12 and 1 o'clock, FREE. None but Ladies will be admitted. This is *intended* for those who desire to inhale the Gas, although others will be admitted.

Entertainment to commence at 7 o'clock. Tickets 25 cents—for sale at the principal Bookstores and at the Door.

dec 10 1d

Fig. 2—Left: An ether frolic, early nineteenth century. (Illustration courtesy of Abbott Laboratories.) Right: Advertisement for an exhibition on nitrous oxide appearing in the Hartford Courant, December 10, 1844. (Illustration courtesy of Yale Journal of Biology and Medicine)

Fig. 3—John C. Warren excising a neck lesion, while William T. G. Morton administers ether, October 16, 1846. (Illustration courtesy of Abbott Laboratories)

Morton. Dr. Warren removed an extensive tumor of the neck painlessly. The now famous line "Gentlemen, this is no humbug" was then first spoken (Fig. 3).

In an attempt to gain monetary control over this invention, Morton and Jackson called the gas Letheon which was nothing more than a disguised form of sulfuric ether. The name Letheon was suggested by a Dr. A. A. Gould and was derived from the Greek word meaning oblivion. However, on or about November 6, 1846, Morton was forced to reveal the nature of the substance to the authorities of the Massachusetts General Hospital and on November 9, H. J. Bigelow read the paper at the meeting of the Boston Society of Medical Improvement in which he stated that Letheon was indeed sulfuric ether. The age of surgical inhalation anesthesia had at last truly arrived. It was at this time on November 21, 1846, that Oliver Wendell Holmes wrote the following letter to Dr. Morton.

My dear sir:

Everyone wants to have a hand in the great discovery. All I will do is give you a hint or two as to the names, or name, to be applied to the state produced and to the agent. The state should, I think, be called anaesthesia. This signifies insensibility more particularly (as used by Linnaeus and Cullon) to objects of touch. The adjective will be an anaesthetic. Thus, we might say the "state of anaesthesia" or the "anaesthetic state." The means employed would be properly called the anti-aesthetic agent. Perhaps it might be allowable to say anaesthetic agent. But this admits a question.

The words anti-neuric, aneuric, neuroleptic, neurolepsia, neurostasis, seem too anatomical; whereas the change is a physiological one. I throw these out for consideration.

I would have a name pretty soon, and consult some accomplished scholar, such as President Everett or Dr. Bigelow, Sr. before fixing upon a term which will be repeated by the tongues of every civilised race of mankind. You could mention these words which I suggest, for their consideration; but there may be others more appropriate and agreeable.

Yours respectfully,
O. W. Holmes

The words anesthesia and anesthetic were accepted readily by the profession which had already become familiar with them.[5]

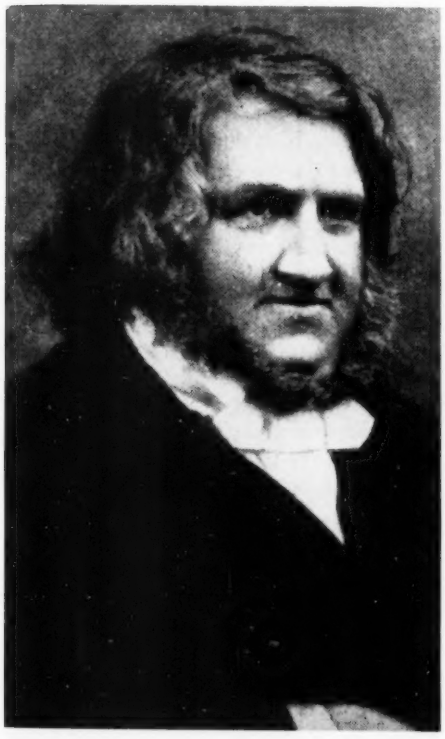
Harry Archer states that a terrific controversy arose between Doctors Wells, Jackson, Morton and later Long for the title of discoverer of anesthesia. The American Dental Association at its fourth

annual meeting at Niagara Falls in 1864 adopted the following resolution:

> . . . Resolved, By the American Dental Association, that to Horace Wells, of Hartford, Conn., (now deceased) belongs the credit and honor of the introduction of anaesthesia in the United States of America. . . .

This resolution was reaffirmed in 1872. The American Medical Association in 1870 at its twenty-first annual meeting held in Washington, D. C., approved the following resolution "on motion of Dr. H. R. Storer of Massachusetts it was resolved that the honor of the discovery of practical anesthesia is due to the late Dr. Horace Wells of Connecticut."[12]

It seems today to be only academic as to who was the true discoverer of inhalation anesthesia. Dr. Wells of course realized the significance and importance of nitrous oxide. Dr. Morton was most instrumental in introducing a practical method of producing anesthesia before an acceptable audience and therefore, of course, was highly successful in seeing anesthesia accepted for the purpose for which it really was discovered, that is, the relief of pain. The four major contestants for the



My Dear Doctor -

I have just received your note & am glad to see you are so well occupied. As to the number of cases I have used it - in to tell you the truth I have not, - for I use it in all - all patients or almost all damaging it here - & letters have & I had I would likely have sent it you. Kept no note or reckoning : In no case have I seen any bad effects to either mother or child traceable to the use of it. But I believe it

. . . . . .

22 April 1847

Fig. 4—Left: James Simpson, leading advocate for chloroform and ether anesthesia in England. (Illustration courtesy of Abbott Laboratories.) Right: Facsimile of Simpson's letter. (Illustration courtesy of Lancet)

honor of being adjudged the discoverer of anesthesia all passed on to unhappy ends. Wells committed suicide in January of 1848, after first having used chloroform to deaden the pain of the suicidal incision. Morton, whose great love was for the acquisition of wealth, became completely impoverished by his many legal efforts to force recognition and died suddenly in 1868 from what is now thought to be a stroke. Long continued his practice of medicine the least moved by the controversy although it is said he was still embittered and died penniless in the year 1878 while administering an anesthetic to a woman in labor. Jackson eventually lost his sanity and died in a mental institution in 1880 after having been confined there for more than seven years. Thus was ended one of the unpleasant aspects of the discovery of anesthesia.

■ *Inhalation Anesthesia*

One of the first European doctors to use ether anesthesia was James Y. Simpson of Scotland (Fig. 4, left). On April 22, 1847, he addressed the following letter (Fig. 4, right) to R. Protheroe Smith.[13] It had to do with the number of instances in which he had administered anesthetics and how he regarded this. He was instrumental in fighting some of the prejudice which was soon to be felt everywhere against the use of the anesthetic.

My dear Doctor:

I have just received your note and am glad to see you are so well occupied. As to the number of cases I have used ether in to tell you the truth I know not, for I use it in all patients or almost all demanding it here and latterly have kept no note or reckoning. If I had I would gladly have sent it you. In no case have I seen any bad effects to either mother or child traceable to the use of ether. But I believe it requires care and management. Of course it will be strongly opposed and for years. I have lately diverted myself by looking over the arguments against vaccination at its introduction. They are exactly the same as those now urged against ether. The alleged production of disease, deaths, (one man, Probey, published 218 deaths from vaccination!) post not propter and. . . .

Lately I had a letter from Retzius of Stockholm about it. He says that our good Creator would have not concealed it so long from us if it had the alleged effect. It is a dangerous argument and bears above equally against vaccination.

What I am laboring after is now to find out the contra-indications to its use. For what constitution should we not use it? I was highly diverted by Dr. Tyler Smith's arguments against it, about the stopping labor, by removing volitions and so on. Practically it does not stop it, at least in its last stages. You will find (in addition to my paper), a series of remarks on it in the monthly Journal and especially the deduction I drew on it in the 15th February at our Obstetric Society. I will enclose the references. Have been suffering today from a horrid headache.

Yours very truly,
J. Y. Simpson

P.S. I have been thinking of writing a short note on ether to the Medical Gazette. Would it do any good?

It was the same Simpson who noticed the irritating effects of ether on the sensitive tissues of the lung and throat and sought for a new agent, and it was he who introduced chloroform in 1847. He used this particularly in anesthesia for obstetrical cases. In 1849 John Snow (Fig. 5) who is generally regarded as the world's first anesthesiologist wrote an important paper on "Pathology and Mode of Communication of the Cholera." It was a triumphant deduction and was a mile-

stone in the history of epidemiology. In 1853 it was the same John Snow who administered chloroform to Queen Victoria for the birth of Prince Leopold. He administered the chloroform in an intermittent fashion which later was to be known as *à la reine*. This event was important in sweeping away the prejudices of the masses and of the medical practitioners of the time, for there was great opposition to the use of anesthesia, particularly in childbirth. Often the objections were based upon erroneous interpretations of the teachings of the Bible. However, when Queen Victoria accepted this form of anesthesia for the birth of her child, it did much to negate the previous opposition. Again in 1857 Snow administered chloroform to the Queen at the birth of Princess Beatrice.

On the one hundredth anniversary of his death a fine article appeared entitled "The Legacy of John Snow" in *Anesthesiology*.[14] The summary from this article states:

> On the 100th anniversary of the death of John Snow the first anesthesiologist and the founder of the science of anesthesiology his life and his work stand as a source of inspiration and wonderment to those who practice this discipline today. We are only beginning to rediscover and appreciate some of the principles which to him were obvious and fundamental.

Appearing in the same article is an interesting description of the manner in which Snow was encouraged to apply his new found knowledge of the physiology of inhalation anesthesia to the practice of medicine. It is quoted as follows:

> One day on coming out of one of the hospitals, he met a druggist whom he knew bustling along with a large ether apparatus under his arm. "Good morning," said Dr. Snow. "Good morning to you, Doctor," said the friend, "but don't detain me. I am giving ether here, there and everywhere and getting quite into an ether practice. Good morning, Doctor." "Rather peculiar!" said the doctor to himself; rather peculiar certainly! For this man had not the remotest physiological idea, "an ether practice." If he can get an ether practice per chance some scraps of the same thing might fall to a scientific unfortunate.

An ether cone of the period shortly after Snow's death is shown in Figure 6.

Although chloroform soon replaced ether as the anesthetic of choice in England, in the United States nitrous oxide continued to be in great favor, particularly among the dentists. The administration of nitrous oxide, however, was not without its problems, both mechanical and physiological. Most of the time the gas was made by the dentists themselves who purchased their ammonium nitrate in bags or barrels and then heated it in batches in an iron retort and passed the resulting gas through three wash bottles containing various chemicals which were intended to purify the gas which was then stored in a gasometer or a container (Fig. 7, left). Naturally then this gas was administered without the aid of oxygen and given until the patient was completely unconscious. The anesthetic, therefore, was one of asphyxia rather than of what today is termed balanced and well-oxygenated anesthesia. While the patient was completely unconscious because of a complete lack of oxygen, the dentist would extract whatever teeth had to be removed. In spite of the fact that nitrous oxide was administered in such an unphysiologic manner, the low mortality rate is certainly significant evidence that nitrous oxide was a relatively safe anesthetic agent.

Fig. 5—John Snow, the leading anesthesiologist of his day. (Illustration courtesy of Abbott Laboratories)

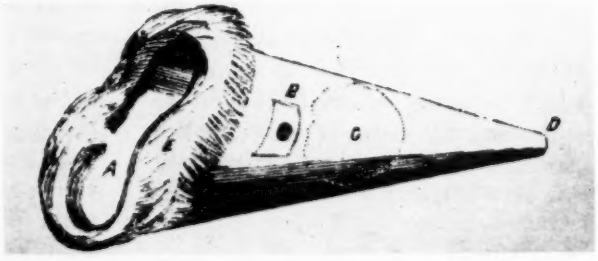


Fig. 6—An early ether cone, 1861. (Illustration courtesy of J. B. Lippincott Company)

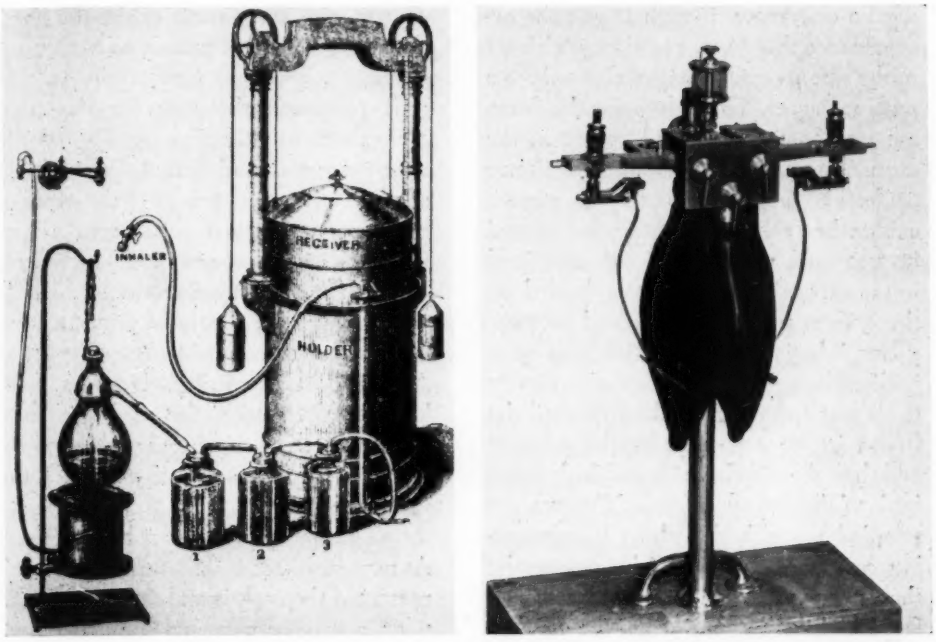


Fig. 7—Left: The early manufacture of nitrous oxide in the office. (Illustration courtesy of J. B. Lippincott Company.) Right: Original model of a McKesson machine about 1909

Prior to 1877 when the S. S. White Dental Manufacturing Co. began to manufacture nitrous oxide in liquefied form at their Philadelphia plant, the manufacture of nitrous oxide on a commercial scale had been carried on by Johnston Brothers in their plant in New York. Such an apparently important step as processing and developing a commercially available form of nitrous oxide may go unrecognized in the development and progress in the field of anesthesia, but several factors were extremely important. First, cylinders had to be designed which could withstand the pressures necessary to liquefy the nitrous oxide and keep it stored, and it was necessary to make valves and pumps which would withstand the pressures. The S. S. White Dental Manufacturing Co. began to manufacture compressed oxygen for therapeutic uses in about 1888, and they believe that they were the first to introduce pure oxygen for medical use.[15] Nonfreezing nitrous oxide now provides the means of insuring a uniform flow, thus giving the operator absolute control over the depth and duration of the anesthetic state.

For many years the idea prevailed that no notable advance in the preparation of nitrous oxide for anesthetic purposes was to be expected, in spite of consistent complaints, from inexperienced operators especially, that "the gas freezes at the valves and the flow is interfered with." What actually was the cause of the freez-

ing no one knew, though it was the accepted idea that it was a tendency inherent in the nitrous oxide, controllable only to a relative degree. The reason for the freezing was finally uncovered: water in the form of vapor suspended in the nitrous oxide. The rapid expansion of the nitrous oxide when the valve was opened created intense cold which froze the contained water vapor. The ice crystals formed on the orifices of the cylinder and pressure valves. The incrustation of ice built upon itself, slowing the flow until the nitrous oxide was entirely choked off or until the frozen ice gave way under the pressure and then the nitrous oxide suddenly came back to the set rate of flow. Oxygen gas afforded no such disturbing phenomena but continued to flow at the rate set by the operator. To maintain and establish flow, both gases must continue to flow evenly and in proportional volume, but when frozen vapor in the nitrous oxide causes the ratio to undergo sudden change it interferes with the narcotic effect of the nitrous oxide upon the patient. The more water vapor present, the more difficult it was for the operator, particularly in extended operations which compelled close attention to the patient and almost constant manipulation of the apparatus regardless of the technic employed. Through efforts of the S. S. White Dental Manufacturing Co., nonfreezing nitrous oxide is completely dehydrated through a series of drying chambers as the last operation before it is pumped into the cylinders. This was a further advance in the technic of the nitrous oxide with oxygen anesthesia which is so widely used today.

In 1868 Edmund Andrews of Chicago demonstrated that by mixing pure oxygen with the nitrous oxide, the anesthetic stage could be prolonged for several minutes without causing asphyxia. He thus pioneered the way for the non-asphyxia anesthesia of today. During the next ten years, Paul Bert of Paris greatly advanced the development of the method, but his cumbersome paraphernalia prevented its general adoption. It was Frederic W. Hewitt of London in the late 1880's who devised the simplified apparatus for the method of administration that made Andrews' idea practical. Hewitt's work laid the foundation for scientific anesthesia which has developed with improvements in apparatus and in purity of the gases used.

The demands of history became clear. As new problems in inhalation anesthesia presented themselves and demanded solutions, a man or men met the challenges. Often, the answer was so simple that it had been overlooked for years. More often the problems were solved by men who were prepared to find the answers because they appreciated what the knowledge of the past had stored up for them. In a little more than a hundred years, inhalation anesthesia progressed from the empirical administration of crudely prepared gases via crudely designed apparatus, to the accurate and finely controlled administration of highly pure agents. Inhalation anesthesia had gone from the open drop, saturated sponge technic of ether and chloroform to the highly refined endotracheal, absorption technic of such modern agents as cyclopropane and Fluothane.

The men who answered history's demand for attention were many, but no roll call in this field would be complete unless were included J. A. Heidbrink,

E. I. McKesson, Frederic W. Hewitt, and Charles K. Teter, all of whom contributed to improving apparatus for administering nitrous oxide safely (Fig. 7, right). Arno B. Luckhardt and W. Easson Brown discovered the anesthetic properties of ethylene, while C. D. Leake and M. Chen introduced divinyl ether. Ralph M. Waters introduced a practical apparatus for the absorption of carbon dioxide during anesthesia and it was he who used cyclopropane as an anesthetic. One of the most important advances in technic was the use of endotracheal anesthesia developed by S. Rowbotham and I. W. Magill. This list of glory could continue, but it must not be forgotten that it was society which provided the need and the environment for all the inventions and discoveries which took place and which still will come.

■ *Regional and Intravenous Anesthesia*

Several other methods of anesthesia developed to a successful status, particularly during the past fifty years. Regional anesthesia and intravenous technics have become highly developed and respected as means of eliminating pain, while other methods such as the use of music or mesmerism have enjoyed only transient popularity, and were found wanting (Fig. 8).

Regional analgesia and intravenous anesthesia would have been impossible, of course, if the syringe and needle had not been invented. Once again, necessity produced advances by Alexander Wood of Scotland, who in 1843 used a crude syringe to inject a solution of morphine through an opening previously made in the skin, and Pravaz of France who first employed a needle in 1853[16] (Fig. 9, left). After Carl Koller, an intern, used cocaine in 1884 to induce local analgesia in the eye by means of an eyedropper it was but a matter of time when someone would put the drug, cocaine, and the instrument, the syringe, together and block a nerve trunk. That someone was William L. Halsted, who blocked the mandibular nerve for the first truly regional anesthetic in 1885. The forces of history moved rapidly after that and in 1899 Alfred Einhorn developed a safer drug, procaine, which has been used ever since for local anesthesia. Einhorn paved the way for others to develop or to synthesize newer anesthetic agents which could be used for regional or nerve block anesthesia.

By those in dentistry who mixed their own anesthetic solutions from a powder or tablet, the development of cartridges with sterile stock solutions was looked on as a tremendous advance to the art and science of anesthesia. Harvey S. Cook was given credit for this important step forward in the history of anesthesia. Figure 9, right, shows early and modern syringes.

Today another important method of administering anesthetic agents, by the intravenous route, is routine. It is not too hard, by now, to imagine that this momentous event did not occur overnight. Indeed, almost sixty years passed from 1875 when chloral hydrate was first used intravenously until 1934 when J. S. Lundy successfully used thiopental sodium by this method. During those years numerous agents were investigated by many researchers in an attempt to find a drug which could be used safely as an aid to anesthesia. Thus have the forces

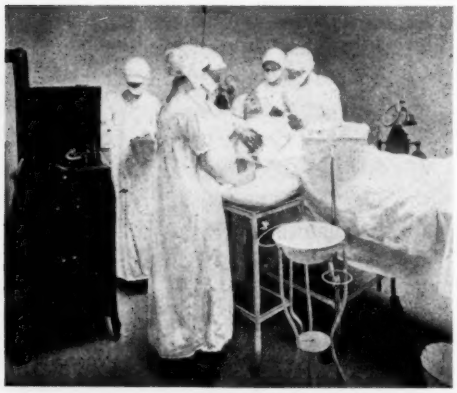


Fig. 8—The use of music during an operation under local analgesia. (Illustration courtesy of Surgery Publishing Company)

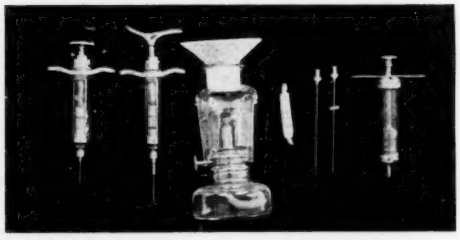


Fig. 9—Left: Instruments for intraoral and extraoral methods. Alcohol lamp with cup holder and graduated porcelain cup to prepare solution. (Illustration courtesy of Surgery Publishing Company.) Right: Early and modern syringes. (Illustration courtesy of Indiana University School of Dentistry)

of history created the environment which has produced the men who have been recognized for their contributions to the growth of anesthesia. The many who remain unheralded must be consoled by the knowledge that it was their work and efforts which provided the milieu for discovery, for "Had Newton been reared a swineherd . . . the law of gravitation would have been formulated by someone else."[17]

■ *Anesthesia in the Future*

Today the use of endotracheal inhalation, intravenous technics, hypothermia and extra-corporeal circulation make possible ever greater conquests in the field of pain control. The future of anesthesia, however, lies not only in the discovery of newer drugs or agents and new methods for their use, but in the awareness that developments in physiology, biochemistry and biophysics will influence anesthesia immensely:

> The control of the patient's vascular system, the control of the patient's temperature, the control of his metabolism, the control of his neuro-endocrine system, the control of his brain —these are the ambitious objectives of surgery and anaesthesia today. They cannot be pursued in isolation. If we wish to increase our knowledge of anaesthesia, and to enlarge its confines, we must have a broad mental outlook. We

must be anxious to associate with the chemist, the biophysicist, the neuro-physicist and the philosopher: to benefit not only from their ideas but also from their technology, and this is a rich field. Physics has contributed the vast range of electronics, spectrophotometric techniques, radioactive isotopes, physical methods of gas analysis, mechano-electric transducers, and other methods of giving visual representation to biological events. Chemistry has furnished enzymes, blocking agents and metabolic poisons; and physical chemistry has given new methods of analysis, and new means of investigating the ionic changes in the body which are so important to us now that the ionic theory of conduction in nerve and muscle is established.

It is only by being ready to take advantage of these developments that anaesthesia can realize its potentialities.[18]

The future which depends on the past was given a challenge in 1871 by Edward R. Squibb in an address before the Medical Society of the State of New York when he said, "Time, that tries all things, has disposed of many of the issues which arose in the early application of anesthesia, but has entirely failed in producing that universally applicable anesthetic – that philosopher's stone for which the alchemists of the profession still vainly search—namely, an agent which shall be potent, but potent only for good."[19] History will not fail that challenge.

*Associate oral surgeon, Henry Ford Hospital.

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■ Psychic Income

Pay, although of great importance, is only one among many factors to be considered in employer-employee relations. Some of the other factors important in both job satisfaction and productivity are the need to give employees a sense of belonging to the workshop or office; the opportunity to do constructive work on important problems; adequate recognition of work well done and a reasonable sense of security. These nonfinancial factors constitute a psychic income and are in many instances far more important to the recruitment and retention of superior employees than pay and fringe benefits.—*M. Mitchell, Editorial, Science, Sept. 26, 1958.*

Present and future problems in oral surgery

■ *Fred A. Henny,* D.D.S., Detroit*

Although the specialty of oral surgery has made great progress in recent years, many problems remain. The solution to them is largely dependent on the constant improvement of graduate education and the continuing development of a strong national oral surgery organization. Both will contribute greatly to an ever-increasing quality of patient care.

The specialty of oral surgery has developed very rapidly in recent years, and it is reassuring to know that the average dentist who elects to pursue this field of graduate study is well above the average academically and has a desire to obtain a proper educational background for future practice. Prior to World War II, the number of training centers offering formal graduate experience was limited. However, because of the stimulation of a variety of factors, many additional training services have been developed, so that a greatly increased number of well-qualified men are now entering oral surgery practice compared to the period prior to World War II. As a result, the American Society of Oral Surgeons has grown rapidly, and regional societies have also come into being to satisfy the need for specialty organizations at that level. The American Board of Oral Surgery has been formed and is functioning expertly in the meticulous evaluation of specialists in this field. Accompanying these organizational developments, there has been a greatly increased liaison between oral surgery organizations and the American Dental Association. Improved liaison has also been accomplished with some other groups in the health field, notably the American Hospital Association and the Board of Trustees of the American Medical Association.

At the same time, there has been a tremendously significant over-all improvement in the quality of patient care which has resulted from improved graduate training in oral surgery. The average oral surgeon is now much more capable of doing the truly major procedures in his field and of accepting the responsibilities of anesthesia and preoperative and postoperative care. Surgical results are generally excellent, and although improvement is still continuing, it can justifiably be said that the average results of the surgical efforts of oral surgeons are much improved over what they were 20 years ago and certainly equal to those of any other medical or dental specialty group.

This paints a very rosy picture indeed and perhaps gives the impression that oral surgeons should be completely satisfied with the present position and progress of their specialty. Unfortunately, this is not the case, for there are a multitude of problems facing oral surgeons today that call for the serious consideration of everyone in this field. Only with almost total coopera-

tion can these problems be overcome and the rate of growth and status enjoyed in the recent past be continued. The individual oral surgeon, whether he be in private practice, in government service, in full-time teaching or in hospital practice, is the key to solving these problems, and no amount of paid public relations programs or organizational effort can be fruitful without his day-by-day contributions of providing expert patient care.

■ *Education*

Development of a strong and ever-improving system of graduate education is the first and foremost of the problems. Without it, oral surgeons will inevitably be forced into a minor role in the field of health care. With a properly integrated educational program that is vigorously supported by the members of their specialty, however, oral surgeons can look forward to the development of an ever stronger specialty which, because of its ability to furnish superior patient care, will always be the leader in its field despite attempts at outside competition. A dynamic educational program, in essence, is the lifeblood of oral surgery.

Actually, graduate education in oral surgery has fallen somewhat into a rut. Programs have been developed along certain lines that were originally thought to be adequate. Perhaps they were adequate ten years ago, but it is obvious to many that they are no longer. Any standardized program must be subject to constant critical review and revision. In the average instance, this has not occurred.

Appropriately, the American Society of Oral Surgeons is taking the leadership in this vital field and has already sponsored one planning conference on the subject and is currently developing another which will be much more comprehensive. As usual, adequate financing is a real problem, but fortunately, in this instance, the Fund for Dental Education has agreed to support the conference financially so that the Society will not be forced to limit the speakers and consultants to oral surgeons. Men who have had professional experience in the broad field of graduate education doubtless can look at the oral surgery educational program candidly and make recommendations that will be beneficial. Out of this conference should come specific recommendations which the American Society of Oral Surgeons then can make to the Council on Dental Education of the American Dental Association. Since the Council on Dental Education has already demonstrated its desire to cooperate in this effort, it will doubtless accept and implement proper recommendations for strengthening of the training programs.

Another problem in education which, although costly, is nonetheless vital to continuing quality, is the inspection and re-inspection of training programs. This must be done on an impartial basis by inspectors who are well qualified and strict. Programs that are weak must be strengthened; those that are not strengthened must be dropped from the accredited list. Otherwise a number of inadequately trained, so-called Board-eligible trainees will continuously flow into private practice to the detriment of the specialty. Some trainees submit to Board examination only to be failed after the expenditure of a great deal of time and money. Obviously, therefore, this program must be accelerated.

The Council on Dental Education has assured that this will be forthcoming as soon as budgetary allowances will permit—perhaps next year.

As stated, the programs in education deserve unlimited individual support. Alumni of a training service should always be interested in its welfare and quality and be desirous of giving continuing assistance. Contributions to library and departmental research funds are simple examples of material aid that will lend steady support to a service, for they will contribute directly to the education of the trainee, who in turn will also have an opportunity to participate in such funds later when he is established in practice. In this way, each man is aiding a program that either assisted him during his residency or will assist the trainees of the future. A healthy measure of pride in a training service produces an *esprit de corps* that is worthwhile and tends to ensure a continuing strong position of the service in the hospital. When all factors are considered, education must be ranked as the most vital factor.

■ *Organizations*

Every scientific group should be adequately represented by an effective national organization with component societies at the regional level. This allows for proper integration of scientific, educational and other programs nationally and locally and produces an over-all cohesiveness of organization that is much more fruitful than when such coordination of efforts is impossible. Oral surgeons are represented nationally by the American Society of Oral Surgeons and regionally by a number of oral surgery societies most of which have different aims, objects and admission requirements. They have no official or unofficial liaison.

The American Society of Oral Surgeons has grown rapidly in the last five years and now has 889 members. Eighty-two new members were added at the last annual meeting, giving rise to the obvious conclusion that total membership will soon reach 1,000. It is inevitable that such rapid growth would produce some growing pains, for such tremendous expansion of the membership of an organization which was originally formed to satisfy the scientific and social requirements of a small, intimate group obviously cannot function properly and progressively without some rather drastic changes. The Society, therefore, at the present time is in the process of reorganization which, if properly executed with a sufficient balance between imagination and realism, will produce a vigorous healthy association that will contribute immeasurably to the progress and welfare of all its members. I am completely confident that this will happen.

Unfortunately, regional societies were organized some time ago without component status. These organizations, therefore, have never been geared to integrate with the national society. To reorganize these groups into active components is proving to be a difficult task, but I am confident that it will be accomplished within the next few years. This fine advance would immediately allow the component societies to bring forth constructive suggestions and resolutions for action by the general assembly and therefore, not only will make the organization more democratic, but also will utilize the abilities and energies of many people in-

stead of just a few. It would also allow efficient and proper coordination of policy and programs at the regional and national levels.

Reference committees for the discussion of vital matters of current policy are to be instituted at the meeting of the Society in New York this year. This is a forward step, for it will allow thorough discussion of matters of policy by all members.

It is hoped that the difficult problem of interlocking membership requirements between the national and component societies can be solved by creating two classes of memberships in the regional groups. One class would be active membership which must be associated with membership in the American Society of Oral Surgeons, and the other, associate membership which would not carry with it the prerequisite of being a member of the national organization. In this way, all the present members of the regional societies would be allowed to continue their active interest and at the same time allow the society to take its rightful place as an active component of the American Society of Oral Surgeons. Much remains to be done in this regard, but it is hoped that some of the leading regional societies will soon take action in this direction and apply for component membership. This would stimulate early acceptance by other groups and permit completion of the program. The Executive Council of the American Society of Oral Surgeons has recently established that "it shall be the declared and official policy to work toward development of regional oral surgical societies as active components of the American Society."

In February 1959, the central office of the American Society of Oral Surgeons was moved to Chicago, occupying space in the new American Hospital Association building on Lake Shore Drive. This has been a tremendous advance, for it allows great strengthening of the liaison between the oral surgery organization and others in the health field, most of which are located in the same vicinity in Chicago. The American Hospital Association has been very helpful. It is aware of oral surgeons' problems and is sensitive to the contributions oral surgeons can make to total health care now and in the future. Day-by-day association of the Society's executive staff with comparable people in other organizations in the health field creates an interprofessional liaison which will be of great assistance in the solution of the problems facing oral surgery.

In addition, the American Society of Oral Surgeons is vitally interested in all of the problems of oral surgeons, including such varied interests as public information, health insurance, life insurance, postgraduate education, quality of patient care, research, prepayment plans, hospital privileges for its members, federal services and national legislation. It is obviously impossible to be completely effective in all these fields without committees that are active and productive and members that are interested, cooperative and willing to give of their time and efforts. Money, of course, is always a problem, and to consummate a program of this type requires a great deal of it. Members should always bear in mind that the organization is functioning for their benefit and if it is to have an effective program it must have adequate financial support. It would be very simple

and inexpensive to hold back and not develop a vigorous program to strengthen the specialty, but I am certain that no one really wants that to happen. Additional income beyond that which is available from dues is being sought as promptly as possible. However, there will be a limit to what can be obtained in this fashion, and the members should always stand ready to assist the organization by payment of additional dues when needed, with the knowledge and understanding that they are basically contributing to their own welfare.

A revitalized program to extend the effectiveness of insurance for oral surgery procedures is certainly needed. The American Society of Oral Surgeons and the American Dental Association are aware of this and are doing everything possible at the national level to bring this about. However, since Blue Cross and Blue Shield have state autonomy, local effort also is required. It is likely that there will be widespread establishment of prepayment plans in dentistry in the near future. This is good, for it will be beneficial to the public and will do much to smooth out the economic dips that are evident in almost every practice. It will of course have a definite effect on the specialty of oral surgery. If requirements for hospital staff appointments are maintained at a high level and are based on adequate graduate instruction in hospital practice, there need be no concern. However, if the door is thrown completely open, it may turn out to be like Pandora's box, for it could allow many dentists who are not properly qualified to perform surgical procedures in hospitals, thereby producing a very poor impression of the dental profession. Oral surgeons cannot properly take the attitude that only oral surgeons should work in hospitals. Rather, they should take the attitude that only dental personnel who have had adequate and proper training or experience in hospitals should be qualified for staff appointments. Although the American Society of Oral Surgeons cannot directly influence this, it can make its attitudes known to the American Hospital Association and to the American Dental Association's Council on Hospital Dental Service who in turn have a continuing opportunity to make suggestions to hospitals. The most effective agency here may well be the state dental association. When qualified oral surgeons become members of the board of trustees of the various state dental associations, it is likely that the boards will listen to their recommendations. The state committee on hospital dental service, which should also have oral surgeons on it, can then make proper recommendations to the board of trustees, which in turn can make its suggested requirements for staff appointments known to the hospitals of the state. This is a problem which must be handled with great care, but its importance cannot be overemphasized.

■ *Research*

Any profession or specialty of a profession that does not go forward will in effect go backward, for the world will pass it by. In the present age of rapid scientific advance, oral surgeons cannot stand completely on old methods, old procedures and old ideas. Instead they must be continually probing, trying to find the answers to the many scientific problems and to devise better methods for correcting or

treating the diseases and deformities that they are called upon to manage.

There has been tremendous progress in the past 25 years. It would be impossible to take proper care of patients by today's standards if only methods, drugs and instruments of 25 years ago were used. Greatly improved anesthesia, easy transfusion of blood and the use of antibiotics have allowed oral surgeons to develop surgical procedures that were either impossible or impractical previously. The search continues and as a specialty group oral surgeons must be in the forefront of it if they are to fulfill their obligations to the public and retain or enhance their professional position. Both federal and private funds are available for dental research programs. Every oral surgery training service should have laboratory and clinical research projects under way at all times. It is stimulating and broadening to the staff and is productive of improvements for the good of the public. The American Society of Oral Surgeons currently is studying methods to stimulate research programs. Successful culmination of this effort is imperative.

■ *Hospital Privileges and Professional Relations*

Some oral surgeons have had unpleasant experiences in their local hospitals because of application of power politics by a few medical specialists whose aims are to completely control the field of oral surgery whether or not they are qualified to do so. This is a tragic circumstance, but fortunately these instances have been relatively few compared to the number of new oral surgery services that have been instituted elsewhere. However, the threat is a continual one in a growing number of communities, for there are a few otolaryngologists and plastic surgeons who are interested in doing all of the oral surgery they possibly can. In direct contrast, the conscientious oral surgeon is vitally interested in continuing to do the work for which he has been trained and is legally and professionally qualified. In some instances, medical specialists can offer the patient results that are comparable to those offered by oral surgeons, but in more frequent instances they cannot. This is indeed a sad commentary, for instances have been reported in which such specialists have been motivated more by commercial than by humanitarian considerations. These incidents should be protested to the hospital authorities with all possible vigor including, if need be, to the board of trustees. Any charges that may be based upon inadequate patient care should be carefully substantiated. In addition, the hospital dental service committee of the state dental association should be prepared in such instances to appear before the proper hospital officials to serve as mediator and to present dentistry's attitude toward adequate management of these problems.

The basic principle then should be quality patient care. If oral surgeons are prepared to offer it by virtue of good comprehensive graduate education and continuing postgraduate education and experience, and if they are properly represented locally and nationally by dental societies and oral surgery associations that are active and vitally interested in the total problem, they can look forward to success. If anything short of a maximum effort is given, oral surgery probably is doomed to

gradual deterioration and oblivion. This cannot be allowed to happen. Public relations is important, but it must be remembered that any public relations program is only as good as the individual oral surgeon who each day in the course of his work is building good public and professional relations. The oral surgeon must not be reluctant to present his views to the proper people. He is derelict if he does not.

■ *Clinical Problems*

Clinical problems will be adequately cared for over a period of time if the program discussed previously is properly implemented. Many problems, however, cry for more investigation. As an example: What causes leukoplakia when there is no evidence of local irritation? What is the true role of alcohol, tobacco and malnutrition in the formation of carcinoma of the mouth? Why do some people develop carcinomas when there is no history or evidence of trauma or irritation? How can both local and general anesthesia be improved to make anesthesia safer and more effective? What is the perfect preoperative sedative and how can it be developed? How can a successful method of rebuilding and replacing the atrophied alveolar process be developed? Can cystic defects be filled with inorganic compounds that will give strength and not become infected, yet be absorbed gradually over a period of time? How can functional and cosmetic results be improved in the repair of cleft lip and palate? How can methods of reduction of jaw fractures be simplified and perfected?

These are but a few of the problems that are currently in need of accelerated investigation to provide their eventual solution. In each instance, there are indications that their solution may be possible. Oral surgeons cannot afford to let them pass unnoticed. If oral surgeons do not solve them, someone else outside of dentistry eventually will.

The problems in oral surgery, then, as I see them, are more complex than they were 25 years ago, despite the fact that patient care has been greatly improved and the organizations that represent oral surgeons have been strengthened. The solution to these problems lies undeniably in an over-all program which is basically one which will steadily improve the quality of patient care and build a strong, effective central oral surgery society. It is dependent on improved education and the continuing growth and effectiveness of the American Society of Oral Surgeons. They, in turn, will lead to further steady improvement in patient care, accelerated research, improved insurance benefits, a betterment of interprofessional and public relations and a general improvement of the over-all status of the specialty. None of this program is possible without the support of every individual oral surgeon. His ability to serve conscientiously and well in oral surgery and other dental organizations is of great importance. It is also important that he be an individual emissary of good, high-quality professional care. He must always be prepared to support his organization financially to whatever extent is required to make it effective. If that kind of cooperation can be obtained, the specialty will surely survive, because it will produce superior treatment of the public. It must be served and oral surgeons must be sensitive to its needs and serve it well.

*Chief, division of dentistry and oral surgery, Henry Ford Hospital.

Dental findings in neuropsychiatric patients

■ *Robert E. Crowley,* D.D.S., Montrose, N. Y.*

A group of 2,213 patients who were admitted to the hospital for neuropsychiatric treatment was studied. Of this number, 2,177 had a comprehensive dental examination. The clinical and roentgenographic dental findings are reported in correlation with the age of the patient. Dental care must be considered in terms of the over-all psychiatric benefit to the patient.

One of the major challenges facing contemporary medicine and dentistry is that presented by chronic disease. Heightened interest in this field is attributed to many causes, among them the decline of the threat of acute diseases; the growing awareness of social and economic depredations of disease, throwing into sharp relief the prominent role of chronic illness; increased longevity with its concomitant increase in chronic disease and, lastly, the public expectation of more attention from medical science than has been given in the past to these conditions.

In the group of chronic illnesses, neuropsychiatric disease is one of the most important. By whatever criteria it is considered, its score is heavy and not the least of its demands is on the hospital beds of the country. More than half the patients in the Veterans Administration hospitals are neuropsychiatric cases. Longer hospitalization periods are required for these patients than for the average general medical and surgical patient. Where the latter's stay is thought of in terms of days or weeks, the time scale for the neuropsychiatric patient is in months and, for many patients, in years. Prolonged hospitalization means that the patient's dental care tends to devolve upon the hospital dental service. Unlike the short-term patient who is soon discharged and can be treated by his own dentist, these patients are cut off from their usual social milieu for significant periods of time.

Another aspect that may be overlooked is that although the hospital stay of many neuropsychiatric patients may appear short, their records show repeated readmissions so that, over a period of years, they have spent a considerable time in the hospital. One such study[1] shows that during a two-year period, out of 1,491 discharged persons, 487 of them (approximately one third) were readmitted 1,030 times for an average of two readmissions for each of these patients. Of these readmissions, patients with incomplete dental treatment at the time of previous discharge (due to their having run away, gone AWOL or having been discharged against medical advice), usually show the same dental disabilities that they had when they left. The shortness of their stay outside the hospital and their own problems of adjustment may prevent them from pursuing their dental care. For such patients, discharge does not transfer any

untreated dental conditions to the private dentist but merely postpones the time till these conditions become again a responsibility of the hospital dental service on the patient's readmission. In view of the generally progressive nature of dental disease, the conditions frequently require more extensive treatment.

Another characteristic of care for those hospitalized for neuropsychiatric reasons is that treatment usually cannot be based on a limited and specific approach. In this, it again differs from care of many of the medical and surgical patients in whom a specific drug or operation disposes of the disease. The psychiatric condition is not circumscribed but involves the patient's whole individuality and the many intangibles of behavior. In psychiatric treatment, such concepts are found as "multiphasic" and "total push programs" in which all aspects of treatment are mobilized for the patient's benefit.

What are the implications of this situation for dentistry? Aside from its expected role of treatment of oral disease, dentistry can make valuable contributions as part of this therapy program. Through prosthetic replacement, for example, the patient's appearance is improved and speech impairments of dental origin are removed; the patient's self-confidence is enhanced and he is encouraged to face the problems of job seeking and social life. Less obvious is the therapeutic value of the treatment situation itself where the patient endures the temporary discomfort in order to obtain a larger gain in health and appearance. Certainly this last is training in a basic situation of life where so frequently a test must be faced to reach some desired goal. The immediacy and obviousness of the rewards of dental treatment make it a particularly valuable area for such re-education, since during such treatment positive attitudes are developed which the patient later can utilize with other problems.

Thus, at the outset of consideration of the neuropsychiatric problem, it can be seen that the longer hospital stay and need for direct contributions to the psychiatric betterment of the patient expand the role of dental care in the direction of more comprehensive treatment and in the application of dental technics with insight into their role as a significant part of the total therapy program. Behind both these obligations stands the basic function of the dental service to treat and prevent dental disease and disabilities. It is in these terms that the objectives ultimately must be expressed. What are these dental problems? Do certain dental diseases occur more commonly among these patients? Are certain dental diseases related to particular psychiatric conditions? How much treatment can be accomplished with this type of patient? To answer such questions, the present project was undertaken.

■ *Plan of Study*

The study was planned to cover the following objectives:

1. Report on the dental findings in a large and characteristic group of neuropsychiatric patients.

2. Report on the dental treatment needed and treatment accomplished and not accomplished in the various categories such as operative or prosthetic; also the reason for noncompletion of treatment.

Table 1

Distribution by sex and race of total patients in study

Sex and race	Total	Patients remaining	New admissions
Total patients	2,213	1,750	463
Male	2,108	1,663	445
White	1,893	1,504	389
Negro	175	132	43
Other	40	27	13
Female	105	87	18
White	96	79	17
Negro	8	7	1
Other	1	1	0

The total female group of 105 patients represents approximately 5 per cent of the 2,213 patients in the study.

3. Analysis of the data for: (a) possible relationship between dental conditions and factors such as age or psychiatric disease; (b) possible interrelationships between the dental findings themselves; and (c) patient's responses to specific procedures, such as operative or prosthetic.

The present report, in addition to serving as a general introduction, covers the first objective; namely, the dental findings in a representative sample of neuropsychiatric patients. It is limited to those conditions relating directly to the teeth. Its purpose is to give a general survey of these conditions as they relate to age, leaving to later studies the more detailed coverage of treatment needs and treatment accomplishments. Similarly, a later paper will cover oral lesions and abnormalities.

■ *Observations*

A compilation was made of the examination findings on all neuropsychiatric patients in the hospital as of June 30, 1954, plus all the neuropsychiatric patients admitted for one year—July 1, 1954, through June 30, 1955. This gave a detailed picture of the total neuropsychiatric patient population for one year. Table 1 shows the makeup of this group of patients. There were 1,750 neuropsychiatric patients remaining; that is, already present in the hospital on June 30. Four hundred and sixty-three neuropsychiatric patients were admitted during the year July 1, 1954, through June 30, 1955, making a total of 2,213 patients. The group was composed predominantly of white men who accounted for approximately 86 per cent of the total, with Negroes making up 8 per cent and other races only 2 per cent. Since women constituted only 5 per cent of the group, nothing would be gained by making a separate study of them and, therefore, they were included in the group. Patients admitted to the hospital for general medical and surgery naturally were excluded from the study. The group already hospitalized as of June 30 included many who had been in the hospital long enough to have had several periodic dental examinations and treatment episodes. To give uniformity to the study, the first dental examinations at the time of these patients' original admission to the hospital were used.

As patients were admitted to the hospital, the dental service received a master card for each one. This card had on it background data of the patient including the diagnosis. The patients were then screened for inclusion in the study on this

Table 2

Median age of neuropsychiatric patients by diagnostic category

Diagnostic category	Median age
Total patients	37.4
A. Schizophrenic reactions	35.4
Simple type	33.8
Hebephrenic type	42.5
Catatonic type	32.2
Paranoid type	36.1
All other schizophrenic types	31.2
B. Total nonschizophrenic	50.7
Other functional psychotics	56.2
Organic psychotics	53.6
Psychoneurotic reactions	35.5
Other psychiatric reactions	38.8
Neurological diseases	51.9

basis. A further check was made by means of the daily "gains and losses sheet" which listed all the patients admitted each day. Before any patients' records were transcribed for the study, the clinical records were checked to ascertain the physician's final diagnosis, which, in some instances, was different from the admitting diagnosis. It was this final diagnosis that was used in identifying the patient's cause of hospitalization. For simplicity, the numerous diagnoses have been consolidated into broad categories, as shown in Table 2, which gives the median age. The average patient was 37 years old. Patients with schizophrenia were in age group (35.4) close to those with psychoneurotic reactions (age 35.5) and other psychiatric reactions (age 38.8). The latter category includes paranoid personality, inadequate personality, antisocial personality, and passive aggressive personality.

In contrast to these younger groups is the older group with organic psychosis (age 53.6) which includes patients with chronic brain syndromes and psychosis due to syphilis, senile psychosis, alcoholic psychosis, and so on; neurological disease (age 51.9) and other functional psychosis (age 56.2). The latter groups consist of patients with manic depressive reactions, psychotic depressive reactions or involutional psychotic reactions. These last are reactions found in the transition from middle to old age and are expected in the older group, as are the various organic difficulties where the process has taken time to produce its psychotic manifestations.

Table 3 shows the number of patients in the different diagnostic groups. The schizophrenics predominated, accounting for 82 per cent of the total number of patients. The nonschizophrenics constituted 18 per cent. It is interesting to note that there are two large age groups —the 30 to 39 year old group (674 patients) and the 50 to 59 year old one (474 patients).

Having determined on the basis of psychiatric diagnosis which patients should be in the study, the patients were scheduled for full mouth roentgenographic examinations. Subsequently, they had their examinations with the roentgenograms available for reference (the detailed analysis of the examination and roentgenographic procedures will be covered in a later study).

Table 4 gives the data concerning

Table 3

Diagnostic category for neuropsychiatric patients by age

Diagnostic category	All ages	Age group (Age given at time of examination)								
		Under 20	20–24	25–29	30–34	35–39	40–44	45–49	50–59	60+
Total patients	2,213	20	177	375	404	270	166	95	475	231
Per cent of total patients	100.0	0.9	8.0	16.9	18.3	12.2	7.5	4.3	21.4	10.5
A. Schizophrenic reactions	1,828	19	167	348	365	224	136	64	358	147
Simple type	86	—	9	21	17	14	6	1	12	6
Hebephrenic type	520	2	18	82	103	47	16	14	175	63
Catatonic type	210	3	33	48	47	20	12	4	34	9
Paranoid type	794	6	68	147	150	117	88	39	116	63
All other schizophrenic types	218	8	39	50	48	26	14	6	21	6
B. Total nonschizophrenic	385	1	10	27	39	46	30	31	117	84
Other functional psychotics	46	—	—	2	2	6	3	5	8	20
Organic psychotics	217	—	4	8	15	17	17	16	89	51
Psychoneurotic reactions	70	—	6	12	15	20	4	6	7	—
Other psychiatric reactions	9	1	—	1	1	2	1	1	—	2
Neurological diseases	43	—	—	4	6	1	5	3	13	11

broad aspects of the oral and roentgenographic examinations. It will be seen that 98.4 per cent of these patients had an examination and 88.3 per cent had roentgenograms—figures that disprove the older idea that large portions of the neuropsychiatric groups were not approachable for dental care. The high percentage of roentgenograms ensures that the examinations would be comprehensive in their survey of hard tissue lesions and abnormalities.

Table 5 gives a picture of the patients as regards missing teeth and replace-

Table 4 • Examination and roentgenographic status of neuropsychiatric patients by age

Item	Total cases	Age group								
		Under 20	20–24	25–29	30–34	35–39	40–44	45–49	50–59	60+
Total patients in study	2,213	20	177	375	404	270	166	95	475	231
Total patients examined	2,177	19	174	370	397	265	159	93	472	228
% total patients examined	98.4	95.0	98.3	98.7	98.3	98.1	95.8	97.9	99.4	98.7
Total patients not examined	36	1	3	5	7	5	7	2	3	3
% total patients not examined	1.6	5.0	1.7	1.3	1.7	1.9	4.2	2.1	0.6	1.3
Total patients with roentgenograms	1,955	19	159	337	366	249	145	81	403	196
% total patients in study with roentgenograms	88.3	95.0	89.8	89.9	90.6	92.2	87.3	85.3	84.8	84.8
Total patients without roentgenograms	258	1	18	38	38	21	21	14	72	35
% total patients in study without roentgenograms	11.7	5.0	10.2	10.1	9.4	7.8	12.7	14.7	15.2	15.2

Table 5 • Missing teeth and replacement status; neuropsychiatric patients by age

Item	Total cases	Age group								
		Under 20	20–24	25–29	30–34	35–39	40–44	45–49	50–59	60+
Serviceable appliances										
Total patients examined	2,177	19	174	370	397	265	159	93	472	228
Patients with missing teeth	2,084	13	151	342	372	259	156	93	471	227
% patients	95.7	68.4	86.8	92.4	93.7	97.7	98.1	100.0	99.8	99.6
Average no. missing teeth per patient	12.6	3.4	5.2	5.6	7.3	9.9	12.6	13.9	20.6	23.0
Completely edentulous patients	296	—	2	2	8	9	14	16	151	94
% of patients	13.6	—	1.1	0.5	2.0	3.4	8.8	17.2	32.0	41.2
Patients with both complete upper & lower dentures	150	—	—	1	6	6	10	13	79	35
% of patients	6.9	—	—	0.3	1.5	2.3	6.3	14.0	16.7	15.4
Patients with serviceable complete upper dentures	184	—	1	2	8	10	17	16	89	41
% of patients	8.5	—	0.6	0.5	2.0	3.8	10.7	17.2	18.9	18.0
Patients with serviceable complete lower dentures	124	—	—	1	5	4	8	10	65	31
% of patients	5.7	—	—	0.3	1.3	1.5	5.0	10.8	13.8	13.6
Patients with serviceable partial upper dentures	77	—	4	10	4	14	8	7	20	10
% of patients	3.5	—	2.3	2.7	1.0	5.3	5.0	7.5	4.2	4.4
Patients with serviceable partial lower dentures	90	—	2	6	4	15	10	9	28	16
% of patients	4.1	—	1.1	1.6	1.0	5.7	6.3	9.7	5.9	7.0
Patients with fixed bridges, serviceable	183	—	9	35	42	32	20	10	20	15
Unserviceable appliances										
Patients with unserviceable complete upper dentures	45	—	—	—	3	7	3	5	18	9
% of patients	2.1	—	—	—	0.8	2.6	1.9	5.4	3.8	3.9
Patients with unserviceable complete lower dentures	30	—	—	—	1	2	3	3	15	6
% of patients	1.4	—	—	—	0.3	0.8	1.9	3.2	3.2	2.6
Patients with unserviceable partial upper dentures	20	—	1	—	8	—	2	2	5	2
% of patients	0.9	—	0.6	—	2.0	—	1.3	2.2	1.1	0.9
Patients with unserviceable partial lower dentures	19	—	1	1	5	1	1	—	6	4
% of patients	0.9	—	0.6	0.3	1.3	0.4	0.6	—	1.3	1.8
Patients with fixed bridges, unserviceable	22	—	1	2	3	5	3	2	3	3

Table 6 • Caries status of neuropsychiatric patients by age

Item	Total cases	Age group								
		Under 20	20–24	25–29	30–34	35–39	40–44	45–49	50–59	60+
Patients with carious teeth (not involving pulp)	1,243	18	138	296	284	183	94	37	139	54
% of patients	57.1	94.7	79.3	80.0	71.5	69.1	59.1	39.8	29.4	23.7
Carious teeth not involving pulp	4,033	80	572	1119	942	575	239	85	313	108
Average no. carious teeth (not involving pulp) per patient	3.2	4.4	4.1	3.8	3.3	3.1	2.5	2.3	2.3	2.0
Patients with carious teeth (involving pulp)	507	4	35	106	108	69	47	17	89	32
% of patients	23.3	21.1	20.1	28.6	27.2	26.0	29.6	18.3	18.9	14.0
Carious teeth involving pulp	989	12	65	190	214	132	108	42	167	59
Average no. carious teeth (involving pulp) per patient	2.0	3.0	1.9	1.8	2.0	1.9	2.3	2.5	1.9	1.8

ments. The data on missing teeth show the expected progression with age from the 20 year old group (showing 68 per cent with missing teeth) to the 60 year old group with 99 per cent missing teeth. The number of missing teeth shows a parallel progression from an average of 3.4 teeth (in the 20 year olds) to 23 teeth (in the 60 year olds). The data on the completely edentulous are interesting since they show rather abrupt increases, one at the age group 30 to 34, one at the age group 40 to 44 (14 patients) and the largest increase in the age group 50 to 59 (151 patients). The latter shows a percentage (32 per cent) about twice as large as in the preceding age group. Of the edentulous patients (296), only one half (150) had complete dentures.

In the following tables dealing with caries, periodontal disease, and so on, it might be felt that since these conditions require the presence of teeth, allowance should be made for the edentulous patient and the rates of occurrence be based only on patients with teeth rather than on all patients examined. This report, however, relates dental findings solely to age and such a reference accepts the conditions found in the aged, including missing teeth. Later, detailed studies of each category will cover the occurrence of the condition in terms of teeth present.

Table 6 shows the caries status of patients. The percentage of patients examined who have caries not involving the pulp shows a typical age pattern from a high of 94.7 per cent (age group 20), to a low of 23 per cent (age group 60). The percentage of patients with caries involving the pulp does not show this steady decline with increased age. Beginning with the 21 per cent group (age 20), there is an increase to 28.6 per cent (age 25 to 29) and this plateau is maintained till an abrupt drop back to 18.3 per cent (age 45 to 49). The rate maintains itself essentially at this level and then in the 59 year old group drops off to 14 per cent.

Table 7 shows the restoration status of

patients and gives data on fillings and crowns. The distribution of patients with fillings shows a high plateau in the 20 to 39 year old group (essentially 90 per cent) with a decline to 84.3 per cent in the 40 year old group. The picture for serviceable and unserviceable fillings follows essentially the same pattern. The presence of crowns shows an increase from 10.3 per cent (age 20 to 24) to 18 to 20 per cent in the 35 to 49 year old group and a subsequent drop.

Table 8 indicates the periodontal conditions. As expected, calculus is a common observation, being present in over 80 per cent of the patients examined. Its incidence shows a rise from the 20 to 24 year old patients, reaching a plateau of 90 per cent in the 25 through 39 year old group. Then it recedes consistently, dropping to 86 per cent in the 40 year old group and, finally, 56 per cent in the 60 year old group.

There is a high incidence of gingivitis in these patients; it is present in over half of all patients. The number of patients shows a considerable increase from 32 per cent (age 20 to 24 year old group) to 51 per cent (age 25 to 29 year old group). There is a further gradual increase through the ensuing age groups until a peak of 66 per cent is reached in the age group of 40 to 44 years. Then a consistent decline sets in.

Periodontal disease is found in one third of the patients. Its occurrence shows a definite increase at the age level 30 to 34. This increase continues with a high plateau of 40 to 50 per cent of the patients examined in the age groups 40 through

Table 7 • Restoration status of neuropsychiatric patients by age

Item	Total cases	Age group								
		Under 20	20–24	25–29	30–34	35–39	40–44	45–49	50–59	60+
Patients with fillings present	1,702	16	162	338	373	244	134	69	259	107
% of patients	78.2	84.2	93.1	91.4	94.0	92.1	84.3	74.2	54.9	46.9
Teeth fillings present	13,284	141	1,541	3,189	3,092	1,934	917	513	1,419	538
Average no. teeth per patient	7.8	8.8	9.5	9.4	8.3	7.9	6.8	7.4	5.5	5.0
Patients with serviceable fillings	1,681	16	161	334	369	240	130	68	257	106
% of patients	77.2	84.2	92.5	90.3	92.9	90.6	81.8	73.1	54.4	46.5
Average no. fillings per patient	8.9	9.6	10.9	10.6	9.4	9.0	7.9	9.1	6.2	5.8
Patients with unserviceable fillings	516	8	53	120	134	81	37	16	48	19
% of patients	23.7	42.1	30.5	32.4	33.8	30.6	23.3	17.2	10.2	8.3
Average no. fillings per patient	1.7	2.3	1.4	2.0	1.7	1.6	1.9	1.6	1.5	1.6
Patients with crowns	320	—	18	53	66	50	32	17	52	32
% of patients	14.7	—	10.3	14.4	16.7	18.8	20.1	18.3	11.0	14.1
Crowns serviceable	601	—	24	105	111	91	75	35	84	76
Crowns unserviceable	39	—	3	11	3	4	2	3	9	4

Table 8 • Periodontal status of neuropsychiatric patients by age

Item	Total cases	Age group								
		Under 20	20–24	25–29	30–34	35–39	40–44	45–49	50–59	60+
Total patients examined	2,177	19	174	370	397	265	159	93	472	228
Patients with calculus	1,769	14	152	351	367	239	137	74	307	128
% of patients	81.3	73.7	87.4	94.9	92.4	90.2	86.2	79.6	65.0	56.1
Patients with gingivitis	1,133	4	56	190	228	154	106	53	245	97
% of patients	52.0	21.1	32.2	51.4	57.4	58.1	66.7	57.0	51.9	42.5
Patients with periodontal disease	677	2	8	45	88	88	69	43	232	102
% of patients	31.1	10.5	4.6	12.2	22.2	33.2	43.4	46.2	49.2	44.7

60. The highest incidence is in the 50 to 59 year old group where the condition is found in one half of the patients.

A comparison of the age at which the highest incidence of these conditions occurs shows the age 25 to 29 for calculus, 40 to 44 for gingivitis and age 50 to 59 for periodontal disease.

Table 9 shows the status of impacted teeth and patients with retained roots present. Patients with impacted teeth are most numerous in the groups below 20 to 24 years of age, with a significant drop at the age 25 to 29, and occurrence continues low in the older groups. The number of patients with roots present shows an expected increase with age, stabilized at about the 10 per cent level in the age range 35 through 60 years.

It might be convenient to show a picture of the average neuropsychiatric patient hospitalized here as he appears in the light of this study. Our description, of course, is limited to the findings that relate directly to the teeth. Such an "average" patient would be a white male veteran of World War II, age 37. He would have a diagnosis of schizophrenia. He would have had a regular dental examination with roentgenograms. He

Table 9 • Status of impacted teeth, roots, in neuropsychiatric patients by age

Item	Total cases	Age group								
		Under 20	20–24	25–29	30–34	35–39	40–44	45–49	50–59	60+
Patients with roots	179	—	4	25	26	21	19	7	53	24
% of patients	8.2	—	2.3	6.8	6.5	7.9	11.9	7.5	11.2	10.5
Number of roots	314	—	5	34	40	34	38	12	114	37
Patients with impacted teeth	187	8	46	51	35	20	6	11	5	5
% of patients	8.6	42.1	26.4	13.8	8.8	7.5	3.8	11.8	1.1	2.2
Number of impacted teeth	310	19	91	81	54	24	9	21	5	6

would be missing approximately 12 teeth and probably does not have a partial denture or bridge replacing these missing teeth. He has three carious teeth and seven teeth with fillings present. His teeth have calculus deposits on them. There is an even chance that he has gingivitis and only a 30 per cent chance of his having periodontal disease. He is not likely to have retained roots or impacted teeth.

■ *Summary*

The role of dentistry in treating the hospitalized neuropsychiatric patient is influenced by his relatively longer hospitalization which means that more comprehensive treatment is required and dental technics and the dental treatment situation itself must be considered in terms of the over-all psychiatric benefit to the patient. This necessitates a clearer definition of the dental problems of these patients. To meet this need, the present study with the objectives outlined was undertaken of all neuropsychiatric patients hospitalized at any time during a one-year period. This resulted in a group of 2,213 patients. Of these patients, 2,177 had a dental examination and characteristic findings that relate directly to the teeth and which are reported in terms of the patients' age.

*Chief, dental service, Veterans Administration Hospital.

1. A study of duration of hospitalization and readmission rates of a group of psychotic and neurological patients. Veterans Administration, department of medicine and surgery, Information Bulletin, psychiatry and neurology division, January 1951.

■ CONSERVATISM IN CANCER OPERATIONS

There are at least three biologic types of cancer: (1) malignant tumors that do not tend to metastasize; (2) malignant tumors that metastasize chiefly to the regional lymph nodes, and (3) malignant tumors that have metastasized systematically before the primary tumor is recognized. It is only in treatment of the cancers that tend to metastasize solely to regional lymph nodes that radical resections of lymph nodes are of value. In some kinds of cancer, like squamous cell tumor of the mouth, metastasis limited to the regional nodes is so common that radical surgery is justified. In other types of cancer, however, the tumors tend to be so widely disseminated before the presence of the primary tumor is recognized that little is gained by extending the scope of operation. In these instances, involvement of lymph nodes is more a sign of incurability than an indication for extending the scope of operation. There are many types of cancer which tend to be localized and can be cured by local treatment. If extensive surgery is performed to cure such localized tumors, the morbidity and mortality of the operations far exceeds the possible dangers of recurrence after local treatment. Overtreatment of patients with cancer may be just as dangerous as undertreatment. A proper balance is a matter of clinical judgment in each individual instance.—*George Crile, Jr., The Case for Conservatism in Operations for Cancer, The Surgical Clinics of North America, October 1958.*

The use of regional anesthesia with general analgesia in oral surgery practice

■ *Bruce L. Douglas, D.D.S., and Harold Kresberg, D.D.S., Rego Park, N. Y.*

In about 5,900 oral surgery patients, nitrous oxide-oxygen analgesia with local anesthesia was used; only 89 patients reacted unfavorably. In the third plane of analgesia, supplemental local anesthesia provides an effective, safe and relatively comfortable anesthetic technic for the ambulatory oral surgery patient. The patient awakens almost immediately on completion of the procedure and needs minimal time for postanesthetic recovery. Patients are completely oriented within minutes after the procedure.

To some, the technic of using nitrous oxide-oxygen analgesia with regional anesthesia is an old one. Many consider it the forerunner of modern general anesthetic technics for ambulatory patients. Others feel that it is outmoded and that it has been replaced with more up-to-date methods. The authors wish to emphasize the fact that this method of anesthesia for office procedures evolved after extensive trials with other accepted technics. We believe that the basis for the amazingly universal applicability of this technic is the great improvement in the regional anesthetic agents now available for dental surgery.

Anesthesia must be used for all oral surgical operations. Therefore, it is an indispensable part of the practice of oral surgery.

The safest anesthesia for a surgical procedure in the mouth is regional anesthesia. Neuroanatomical distribution in the region of the oral cavity is particularly amenable to regional or local anesthetic technics. When local anesthetic agents are used in an aspirating syringe in small quantities, with a vasoconstrictor, undesirable side reactions are extremely rare.

If regional anesthesia is used alone, the surgical procedure can be an unpleasant experience for the patient. Nitrous oxide-oxygen analgesia can be an effective means for providing physical and mental relaxation during the operative procedure. If desired, the injection of the local anesthetic solution can be given while the patient is under the effects of the analgesia. The basis for success with this technic is the effectiveness of the regional anesthesia. The nitrous oxide-oxygen analgesia is used solely as a supplement and is

rarely adequate in itself as a surgical anesthetic.

We have found that this technic is effective in approximately 95 per cent of all patients who require oral surgical operations on an ambulatory basis, regardless of the extent of the operative procedure.

■ *Exceptions*

There are some patients for whom the analgesia-local anesthesia technic is relatively ineffective. For some patients, it is even undesirable. These patients should be discovered during the preanesthetic evaluation.

Alcoholics, drug addicts, and muscular male patients often cannot be handled effectively with this technic. Nitrous oxide-oxygen may not produce even mild analgesia in such patients, unless the oxygen is reduced to subphysiological levels (below 20 per cent), where the line between effective analgesia and the so-called excitement stage may be very narrow. This does not mean that analgesia can never be used with these patients, but it should only be attempted after extensive experience with the technic. Strangely, analgesia sometimes can be induced in such patients with very high percentages of oxygen, preparatory to introducing the local anesthetic agent.

Most often these patients can be handled best and most safely with local anesthesia preceded by the use of a hypnotic premedicant drug. If general anesthesia is necessary, an intravenous barbiturate should be used. For a lengthy procedure to be performed with the patient under general anesthesia, hospitalization is often advisable.

■ *Use of General Anesthesia for Oral Surgery Patients*

Total general anesthesia is rarely necessary for an oral surgical procedure for ambulatory patients. If the patient or a referring doctor requests general anesthesia, it is the moral obligation of the oral surgeon to evaluate the basis for the request. It is his responsibility to use the safest, and at the same time most effective, anesthetic technic. General anesthesia should not be used just because it is requested. If the reason for the request is the patient's fear of "needles" (which is usually the basis for a patient's desire to have general anesthesia), nitrous oxide-oxygen will suffice to make the injection less unpleasant. Even though patients occasionally respond to the insertion of the needle under light analgesia, there is very rarely any recollection of the injection.

There is occasionally a tendency to cater to the whims of patients. The administration of a general anesthetic is too great a responsibility to use it just because of a patient's desire to be "asleep" for the operative procedure.

■ *Clinical Research Project*

In our oral surgery practice we have used a number of different anesthetic agents, including thiopental sodium with nitrous oxide-oxygen; nitrous oxide-oxygen-vinyl ether; nitrous oxide-oxygen-trichloroethylene; and intravenous barbiturate anesthesia with short-acting muscle relaxants and nasoendotracheal intubation for longer procedures. We have discarded the use of vinyl ether, very rarely use trichloroethylene, and find that intravenous barbiturates (thiopental sodium and, more

recently, sodium methohexital) are effective in most instances in which the analgesia-local anesthesia technic is inapplicable. Local anesthesia can be used to supplement any of these methods, and occasionally was used to facilitate the use of lighter anesthesia or analgesia.

Premedication has its place for ambulatory patients. The unpredictability of the oral route makes this route of administration a poor one. Rectal suppositories are sometimes useful in handling obstreperous children. Only the intravenous route provides an effective and predictable means of premedication. Nevertheless, for short procedures premedication is very rarely necessary, particularly in the analgesia-local anesthesia technic.

This clinical research project is based on observations on over 6,000 patients. There were a number of patients included in this amount in whom other technics were used for a variety of reasons. Of the total number of patients who were evaluated preanesthetically and considered to be good risks for the analgesia-local anesthesia technic, 89 patients reacted unfavorably. Two hundred and twelve patients, in the preanesthetic screening process, were felt to be unsuitable for the analgesia-local anesthesia technic. These were all adults and were anesthetized with intravenous barbiturates and nitrous oxide-oxygen. In 87 children, all of whom had extractions to be done in three or four quadrants of the mouth, trichloroethylene had to be added to the anesthetic mixture. In these particular instances, when local anesthesia was also used, vasoconstrictors were omitted.

In approximately 5,900 patients, nitrous oxide and oxygen were used with regional anesthesia. This number included many patients to whom multiple injections were given in many different parts of the mouth. In our opinion, the necessity to inject local anesthetic agents in a number of different regions is not a contraindication for the use of the analgesia-local anesthesia technic. As a matter of fact, patients are more comfortable immediately postoperatively if the operative region is numb.

■ *Technic*

All patients are instructed not to eat or drink for five hours preanesthetically. This precaution is probably unnecessary for the majority of patients, but there is an occasional bout of nausea or vomiting or both postanesthetically which could be avoided by abstinence from food. Usually a patient who has just eaten can be handled effectively by maintaining him in a very light analgesic state, with as much as 80 to 85 per cent oxygen. This is difficult, and sometimes impossible, to do with children.

The degree of relaxation in the deeper planes of analgesia is somewhat unpredictable. Therefore, it is advisable for all patients to void prior to the administration of the anesthetic.

Every patient under analgesia in this technic is restrained. This is absolutely necessary to the success of the anesthetic. We prefer to use an operating table for all surgical procedures. Patients can be much better restrained in the supine position. The straps are applied as the patient begins to fall asleep. Few patients recall the fact that they were restrained and, if the restraints are applied at the proper time, none objects.

INDUCTION—Induction is governed largely by the wishes of the patient. If the patient expects to be completely anesthetized for the procedure, anesthesia should be induced with 75 per cent nitrous oxide and 25 per cent oxygen. There is never any necessity with this technic to give the patient less than 25 per cent oxygen. It is preferable to start the procedure with a full face mask (see illustration, above left). A mouth prop should be placed on the opposite side of the mouth from which the operation is to take place while the patient is awake. If the anesthetist prefers, the nosepiece can be applied initially and the patient instructed to breathe through his nose. If the patient fails to follow this instruction, the full face mask should be used, or the mouth can be covered or packed lightly with a large piece of gauze. If gauze is used in the oral cavity at any time during the technic, great care should be taken not to irritate the gag reflex by placing the gauze too far posteriorly.

Usually within one minute after the patient begins to inhale this mixture of gases, the injection can be made (see the illustration, below left). The ability of anesthetist and surgeon to work together at this point is of critical importance. The injection should be given as early as possible, even if there is a slight response. There may be some movement, especially as the point of the needle comes into contact with periosteum, but this is of no consequence.

If a patient is not particularly concerned about being "completely asleep" for the surgical procedure, but is just eager to avoid the pain of injection, 25 per cent nitrous oxide and 75 per cent oxygen is often adequate for induction. In others, the anesthetist may choose to use a 50:50 mixture. Small children should almost always receive 75 per cent nitrous oxide and 25 per cent oxygen and should be maintained at that mixture even after the local anesthetic is injected.

REGIONAL ANESTHESIA—The regional anesthetic is the anesthetic for the surgical procedure. Nitrous oxide-oxygen analgesia cannot be depended on to provide adequate surgical anesthesia. There may be an occasional exception to this in the case of loose anterior teeth and, sometimes, for the removal of deciduous teeth in children. Therefore, the surgeon must be proficient at achieving efficient regional anesthesia, especially since the patient cannot be questioned for the signs and symptoms of anesthesia.

There are now on the market a large number of regional anesthetic agents, profound in effect and low in toxicity. The value of the analgesia-local anesthesia technic has been greatly enhanced by the advent of these agents.

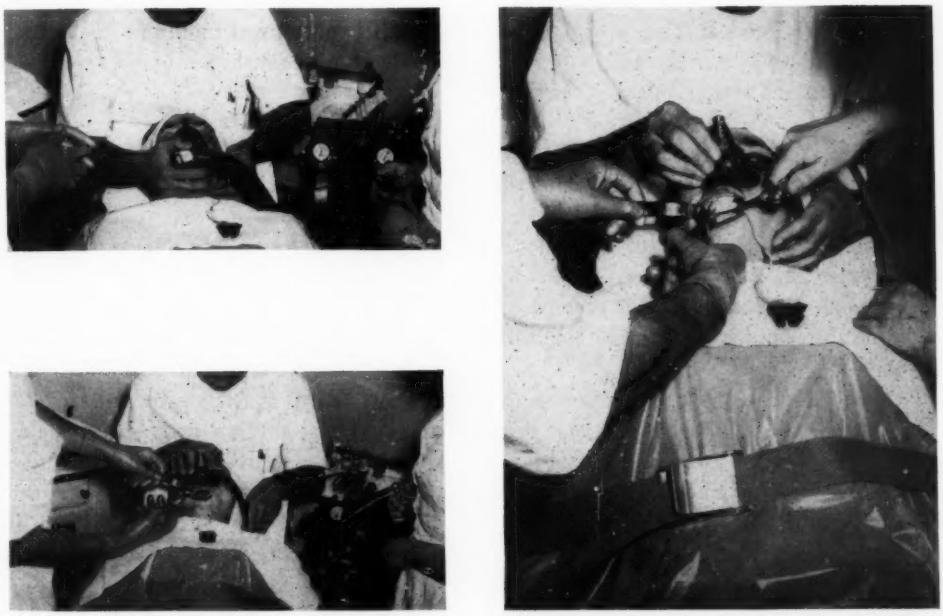
MISCONCEPTIONS ABOUT THE USE OF LOCAL ANESTHESIA—Two misconceptions about the use of local anesthesia should be corrected. These corrections are both important to the application of this technic.

1. Injections can, if necessary, be given into an infected region without danger. Since this can cause undesirable sequelae, great discretion should be used if this is done. A needle withdrawn from an infected region should be discarded immediately and a new syringe used for

further injections. It is unwise and generally ineffective for an injection to be given directly into an acute abscess. For incision and drainage, the solution should be deposited superficially. The analgesia will usually be adequate to allow for exploration of the region with a hemostat. If an extensive area of cellulitis is to be drained, the patient should be put into deeper anesthesia if there is not ample opportunity for operating in analgesic depths. It is often safer with such patients, who are often toxic, to do a venipuncture at the start of the procedure, and to run an intravenous drip of saline or dextrose in water throughout the procedure. An ultra-short-acting barbiturate can then be administered without loss of time if necessary.

2. In instances of pericementitis, regional anesthetic technics are more effective than was the case years ago. Injections given into the periodontal membrane and subperiosteally will usually achieve effective surgical anesthesia. The added analgesia usually compensates for whatever sensitivity there may be during the removal of the tooth.

THE SURGICAL PROCEDURE—Surgery can commence whenever the regional anesthetic has taken effect (see the illustration, right). We have found Duocaine (2



Above left: Application of full face mask at start of induction of analgesia. Below left: Insertion of needle for regional anesthesia. Full face mask has been replaced with nosepiece. Right: Extraction of tooth after injection of local anesthetic solution

per cent procaine and 1.25 per cent butethamine) to be highly satisfactory in the analgesia-local anesthesia technic. Exodontic procedures can usually be begun within a half-minute to a minute after infiltration injections in the maxilla and shortly thereafter in block anesthesia or in those instances in which infiltration is used for mandibular surgery. It must be repeated that accurate injection technic is of great importance. The entire procedure can fail if the local anesthesia does not take effect properly and must be given a number of times. For this reason, one of the agents which is profound enough to have at least partial effect if used for infiltration of the mandible should be used.

While the surgical procedure is being performed, there should be a gauze curtain blocking the pharynx from the surgical site. A good suction apparatus is necessary in this technic, and a trained assistant should round out the surgical team.

If the analgesia is begun with a full face mask, it should be removed and replaced with a nosepiece at the moment that the anesthetist feels that the local anesthesia can be introduced. The assistant should assist with this change so that the surgeon does not contaminate his hands.

We prefer to use a McKesson Nargraf anesthesia machine for the analgesia procedure with a re-breathing bag attached. The bag is a child's size and can be emptied very easily by manual pressure, which avoids any accumulation of nitrogen or carbon dioxide. The procedure is accomplished with a semi-closed system. An O'Connell "whistle" attachment is used on the nosepiece to provide audible breathing sounds during the procedure (note the illustration, below left).

LENGTH OF THE PROCEDURE—There is no time limit in the use of the analgesia-local anesthesia technic for ambulatory patients. The patient, after the injection of the local anesthetic, can be kept in light analgesia as long as the effect of the regional anesthetic is maintained. If it is anticipated that the procedure may last longer than 20 minutes to a half hour, preoperative medication with either atropine or scopolamine should be used to diminish pharyngeal and tracheal secretions, which can be irritating to the patient.

If there is justifiable cause for a lengthy general anesthetic, it is our opinion that the patient should be intubated. Generally speaking, a procedure of such length is performed more effectively and safely in a hospital.

■ *Planes of Analgesia*

When Arthur Guedel gave medical science his classic table of anesthetic signs and stages in 1937, he referred to the first stage as "analgesia." He made no effort to break this stage into planes as he did with the third or surgical stage. In that period, the surgical stage was all important, because only with adequate depth could sufficient relaxation be achieved for many general surgical procedures. Today there is a greater emphasis on light anesthesia and a greater tendency to perform even major surgery with the patient in the analgesic stage because of the advent of the muscle relaxant drugs.

For oral surgical procedures, muscle relaxation is unimportant, as long as a mouth prop is inserted before induction

so that the jaws do not have to be forced apart while the patient is under analgesia.

New applications of the analgesic stage have necessitated a re-evaluation of the degrees of analgesic depth. Douglas[1] subdivides the analgesic stage into three planes. The patient descends from an awake state into the first plane rather rapidly, depending on the concentration of nitrous oxide and oxygen and the individual reactions of the patient. The time of day is also important (late in the day patients are more susceptible to the effects of the nitrous oxide) as well as the use of premedication.

Guedel[2] considered the period of analgesia as one of "altered consciousness." Subsequently analgesia has been regarded by most anesthesiologists as a state of diminished pain in which consciousness is maintained.

The present-day emphasis on the analgesic stage has brought new light to Guedel's evaluation and points out the necessity for discarding the idea that a patient in analgesia must be conscious. We have found in the use of the analgesia-local anesthesia technic that patients descend into a state of "asleepness" or unconsciousness prior to entering an excitement stage or the stage of surgical anesthesia, which either must be regarded as "deep analgesia" or a separate stage of anesthetic depth. Klock[3] calls this plane "amnalgesia." For simplicity, we prefer to refer to this as the third plane of the analgesic stage.

PLANE 1—Plane 1 is the lightest plane of analgesia during which the patient is still conscious, aware of his surroundings, but in which pain is diminished. Some operative dental procedures can be accomplished in this plane without pain or discomfort.

PLANE 2—The middle plane of analgesia in which the patient lingers between consciousness and unconsciousness is termed Plane 2. In this plane, signs of pain might be exhibited during an operative or surgical procedure, but there is no recollection of the pain in the postanalgesic period.

PLANE 3—Plane 3 is the plane in which some minor surgical procedures of short duration can be undertaken without pain, but in which the patient may react to particularly painful stimuli. Severe pain or irritation in this plane can push the patient into a stage of disorientation or excitement (stage two). For this reason and because there is not enough relaxation in this plane to perform an extensive surgical procedure, the analgesia should be supplemented with local anesthesia. The eyelid, swallowing, gag and cough reflexes are all present in this plane. The patient who undergoes surgery in this plane, when local anesthesia is also used, awakens with the feeling that he has been under total anesthesia.

Patients who experience analgesia are particularly susceptible to hallucinations and dreams. For that reason, the psychological approach to the patient preanesthetically is of great importance. They should be in as relaxed a state of mind before the procedure as possible. A quiet, pleasant approach to the patient is, therefore, particularly important. Music in the operating room also has been found to be advantageous.

DISCUSSION—The description of Plane 3 clearly indicates that, according to this interpretation, a patient in the analgesic stage need not be conscious. This fact is of great importance to the use of the analgesia-local anesthesia technic. There is no doubt that sometimes the patient is merely "asleep" from fatigue or central nervous system depression, but if he is not in the so-called excitement stage or in surgical anesthesia, he is in Plane 3.

■ *Conclusions*

1. The safest anesthetic known to modern oral surgery is regional or local anesthesia.

2. The addition of nitrous oxide-oxygen analgesia to local anesthesia provides an effective and relatively comfortable anesthetic technic for the ambulatory oral surgical patient.

3. A patient receiving analgesia in this technic need never receive less than 25 per cent oxygen.

4. Analgesia is subdivided into three planes. In the third plane, the patient is asleep and unconscious. It is in this plane that analgesia supplemented by regional anesthesia provides the oral surgeon and oral surgical patient with adequate anesthesia for any surgical procedure in the mouth.

5. Experience with over 6,000 patients indicates that the analgesia-local anesthesia technic is the safest one for the ambulatory oral surgical patient who requires more than local anesthesia for an oral surgical procedure.

6. Patients who are subjected to the analgesia-local anesthesia technic awaken almost immediately on completion of the procedure and need minimal time for postanesthetic recovery. There is practically no nausea if the patients refrain from eating or drinking for five hours preanesthetically, and minimal gastrointestinal upset even if the patient eats shortly before the procedure.

7. Patients are completely oriented within minutes after the procedure and can leave the office safely. There is practically no absorption of nitrous oxide, and it is liberated quickly.

8. The effect of the local anesthetic in the region of surgery provides the patient with a relatively comfortable immediate postanesthetic state. By the time the local anesthetic begins to wear off, the patient is often home and can start taking analgesics to relieve whatever postsurgical pain may develop.—93-08 *Queens Boulevard.*

1. Douglas, B. L. Re-evaluation of Guedel's stages of anesthesia. J. Am. D. Soc. Anesth. 5:11 Jan. 1958.

2. Guedel, A. E. Inhalation anesthesia. New York, Macmillan Co., 1937.

3. Klock, J. H. New concept of nitrous oxide anesthesia. Anesth. & Analg. 34:379 Nov.-Dec. 1955.

VOLUME 17 • SEPTEMBER 1959 • NUMBER 5

EDITORIALS

A century of progress

THIS YEAR the American Dental Association observes its one hundredth birthday. It seems fitting therefore, that the JOURNAL OF ORAL SURGERY, ANESTHESIA AND HOSPITAL DENTAL SERVICE devote one of its issues to historical aspects of dentistry's oldest specialty, oral surgery. It is hoped that readers will find the material herewith presented a valuable adjunct to the June issue of its sister publication, THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, which was devoted to a history of the Association and to its contribution to dental research, education and social service.

The contents of this month's issue is presented as a small and inadequate expression of the respect which the American Society of Oral Surgeons holds for the achievements of its parent body, the American Dental Association—achievements which have contributed greatly to the firm establishment of dentistry as a major health profession. The Association's accomplishments during its first one hundred years promise even greater accomplishments in the future—accomplishments in which oral surgery will logically and rightfully share.

Even a superficial review of the history of the American Dental Association reveals the importance of its influence in the standardization of a high level of dental education, in the stimulation of technical advances and more recently in the development of an extensive research program to reduce the ravages of dental disease. This indeed augurs well for the future of American dentistry, for it demonstrates the capability of our organizational leadership and the contributions the profession has made at the local and national levels.

It would also seem evident that American dentistry is rapidly heading in the direction of even broader educational objectives while it still continues the emphasis on the mechanical skills that are so important to our profession. It is hoped that this trend will continue and that our educational standards will continually be broadened and improved. The tremendous importance of graduate study to our profession and to the public is rapidly becoming apparent, and as usual the American Dental Association is in the forefront of this development by its continuing efforts to develop, strengthen and inspect such formal programs of study.

Our congratulations to this wonderful professional organization are coupled with the expectancy that it will continue to develop so rapidly that it will achieve even greater results in the next twenty-five years than it has in the past hundred.—*Fred A. Henny.*

■ In recent years there has been some confusion in the literature and in scientific sessions about the terminology of various anatomic structures. In 1955 a report was submitted to the Sixth International Congress of Anatomists, held in Paris, and was approved by the whole International Nomenclature Committee on July 24, 1955. The report is contained in the *Nomina Anatomica* published in 1956 by The Williams and Wilkins Company of Baltimore, Maryland. Following are the terminology changes of the head and neck which were abstracted from this report by Doctor Alton D. Brashear.

OLD TERMS	NEW TERMS
Arteries	
Buccinator A	Buccal A
External Maxillary A	Facial A
Internal Maxillary A	Maxillary A
Hyoid of Superior Thyroid A	Infrahyoid of Sup. Thyroid A
Greater Palatine A	Descending Palatine A
Hyoid of Lingual A	Suprahyoid of Lingual A
Veins	
Anterior Facial V	Facial V
Posterior Facial V	Retromandibular V
Internal Maxillary V	Maxillary V
Lymph nodes	
Submaxillary L. N.	Submandibular L. N.
Deep Facial L. N.	Buccal L. N.
Nerves	
Sphenopalatine N.	Pterygopalatine N.
Accoustic N.	Stato-accoustic N.
Recurrent Meningeal N.	Meningeal Ramus
External Pterygoid N.	Lateral Pterygoid N.
Internal Pterygoid N.	Medial Pterygoid N.
Long Buccal N. (V)	Buccal N.
Buccinator N. (VII)	Buccal Ramus
Spinal Accessory N.	Accessory N.
Greater Superficial Petrosal N.	Greater Petrosal N.
Lesser Superficial Petrosal N.	Lesser Petrosal N.
Triangles	
Submaxillary	Submandibular
Ligaments	
Temporomandibular L.	Lateral Ligament
Glands	
Submaxillary G.	Submandibular G.
Muscles	
Quadratus Labii Superioris	
1. Infraorbital Head	Levator labii Superioris
2. Angular Head	Levator labii Superioris Alaeque Nasi
3. Zygomatic Head	Zygomaticus minor
Caninus	Levator Anguli Oris
Zygomaticus	Zygomaticus Major
Triangularis	Depressor Anguli Oris
Quadratus Labii Inferioris	Depressor Labii Inferioris
Internal Pterygoid	Medial Pterygoid
External Pterygoid	Lateral Pterygoid
Nasal	Compressor Naris
Glosso-Palatinus	Palato-Glossus
Pharyngopalatinus	Palato-Pharyngeus
(Superficial fibers of the depressor angulii oris which cross to opposite side)	Transversus Menti
Ganglia	
Submaxillary G.	Submandibular G.
Sphenopalatine G.	Pterygopalatine G.
Bones Mandible	
Submaxillary Fossa	Fovea Submandibular
TERM DISCARDED	
Joint	Articulation
TERM ADDED	
Lingual facial trunk—to describe the frequent common origin of lingual and facial arteries.	

■ Clinical Dental Hygiene. Edited by Shailer Peterson, M.A., Ph.D. 348 pages with 161 illustrations. Index. $6.75. St. Louis, C. V. Mosby Co., 1959.

This fine book, written primarily for the dental hygienist, should be well accepted for it represents the combined views of 18 contributors who are professors teaching dental hygiene in ten dental schools, plus the advisory editorial committee consisting of seven outstanding members representing different parts of the country.

The status of the dental hygienist as an important member of the dental health team is emphasized. Recognition of the hygienist dates back only 52 years; however, their services now are in such great demand that at present there are 34 dental schools graduating 1,000 dental hygiene students annually.

The text stresses the many responsibilities of the hygienist and points out that she not only should be able to give a thorough dental prophylaxis but should be able, if called upon, to be a dental educator, a dental assistant, a dental roentgenographic technician, a laboratory technician and a receptionist. The foregoing subjects are well covered in an attempt to aid the hygienist in her clinical practice. The chapter on dental materials is most interesting since it describes the uses and properties of materials that the hygienist may manipulate or work upon, such as those used for dental restorations.

A glossary of 16 pages is a fine addition. There is a generous list of review questions at the end of each chapter.

The dental hygienist has attained a high stature and her services have become more valuable as the demands for dental service continue to increase.—*Zar A. Reader.*

■ An Introduction to Periodontia. By Henry M. Goldman, D.M.D., Saul Schluger, D.D.S., D. Walter Cohen, D.D.S., Bernard Chaikin, D.M.D., and Lewis Fox, D.D.S. 346 pages with 180 illustrations. Index. $7.75. St. Louis, C. V. Mosby Co., 1959.

It is refreshing to read this "small but large" text. It is small in that it will fit in your coat pocket but it is large in the excellent way that it covers the ever progressing field of periodontics.

This book was written for the student and the dentist interested in periodontics more than for the specialist in periodontics. It provides a clear, concise, uncluttered background for the subject. All extraneous and unproved theories are omitted. The book seems large in the number, the size, and the excellent selection of photographs and drawings; also, the selected readings at the end of each chapter are well chosen. It is easy to read and the reader is brought up to date with the combined teachings of five very well known periodontists.

The last two thirds of the text describes new, accepted concepts of therapy including such fascinating subjects as gingivectomy; plastic procedures as odontoplasty, gingivoplasty, osteoplasty, and mucogingival surgery; also the infrabony pocket operation. There is satisfactory coverage of occlusal adjustment including an introduction to types of splinting and simple tooth movement.

This text should be highly successful because it will appeal to all dentists, and for those interested it will provide an authoritative introduction to the more formidable books in periodontics.—*Zar A. Reader.*

Announcements

■ Bruce L. Douglas Awarded Fulbright Grant to Teach in Japan

Bruce L. Douglas of Rego Park, N. Y., has been awarded a Fulbright teaching grant to lecture in oral surgery at Okayama University Medical School in Japan during the 1959-60 academic year.

Dr. Douglas is a diplomate of the American Board of Oral Surgery, editor of the *Journal of the American Dental Society of Anesthesiology*, and associate editor of the JOURNAL OF ORAL SURGERY, ANESTHESIA, AND HOSPITAL DENTAL SERVICE, and of the *New York State Dental Journal*.

■ American Academy of Dental Medicine Announces Mid-Annual Meeting

The American Academy of Dental Medicine will hold its mid-annual meeting in New York City Sunday, December 6. A business meeting for delegates and members will be held at 10 A.M. and a luncheon at 12:30 P.M. will follow. Both will be at the Hotel Sheraton-McAlpin.

A scientific program will be held from 2 to 5 P.M. featuring presentations on oral rehabilitation and the gingival tissue, by essayists and clinicians well qualified in the field of dental medicine.

All members of the Academy and other interested dentists and physicians are welcome. Programs and reservations can be obtained from Dr. Andrew J. Cannistraci, 2152 Muliner Ave., New York 62.

■ Washington University Offers Graduate Course in Oral Pathology

The University of Washington School of Dentistry is offering a 24 month course in oral pathology leading to the degree of master of science in dentistry. The course, to begin in September 1960, will be under the direction of Leo M. Sreebny. Special emphasis will be given to training in research in addition to the offering of a sound background in clinical oral pathology.

The submission of a satisfactory thesis reporting on research performed will be a partial requirement. Further information can be obtained from Dr. Saul Schluger, director, Graduate Dental Education, University of Washington School of Dentistry, Seattle 5.

■ Two Week Refresher Course in Oral Surgery Scheduled

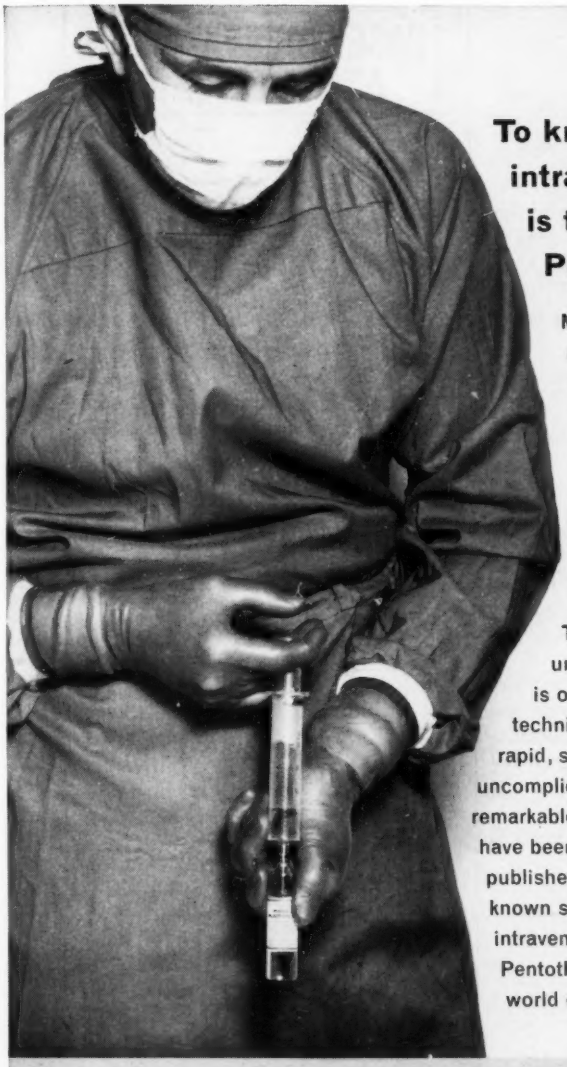
The division of postgraduate education of the University of Illinois College of Dentistry will present a concentrated two week course in oral surgery beginning October 19.

It will consist of lectures and demonstrations designed to cover all phases of exodontics and oral surgery. The class will not exclude specialists in oral surgery, but is primarily planned for dentists in general practice.

Applications and further information can be obtained from the division at 808 S. Wood St., Chicago 12.

■ Joseph L. Bernier Installed As Academy President

Colonel Joseph L. Bernier, chief of the dental and oral pathology division of the Armed Forces Institute of Pathology, was installed as president of the American Academy of Oral Pathology at its annual meeting in Minneapolis.



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